THE IRON AGE

Established 1855 New York, November 14, 1912 *Vol. 90: No. 20*

Photography in a Pneumatic Tool Plant

A Résumé of Methods Used in Connection with the Work of the Ingersoll-Rand Company's Publicity Bureau

The presentation of the case of photography as an important auxiliary in manufacturing and selling which appeared in *The Iron Age* of August 22 can be augmented profitably by a brief description of the practice followed by the Ingersoll-Rand Company. This company maintains an extensive photographic department as an adjunct of its publicity bureau at Easton, Pa., and its experiences and methods may be offered in further explanation of the facilities provided for utilizing photography in large industrial organizations.

Like others which have a large and varied line of product, the Ingersoll-Rand Company finds the use of the camera by its own experts of almost indispensable value not only in connection with the preparation of its catalogues and descriptive literature, but in other directions as well. The output of the photographic department of the company may be divided into five classes as follows: 1.—Shop pictures. 2.—Reproductions of wash drawings, tracings, line drawings and retouched photographs. 3.—Bromide enlargements for framing. 4.—Outside views and installations. 5.—Lantern slides.

In the execution of their work and in devising apparatus to obtain the best results the photographers of the Ingersoll-Rand Company have exercised ingenuity as well as skill. Taking up in their order the various classifications alluded to, many interesting points may be touched on in even a sketch of the methods.

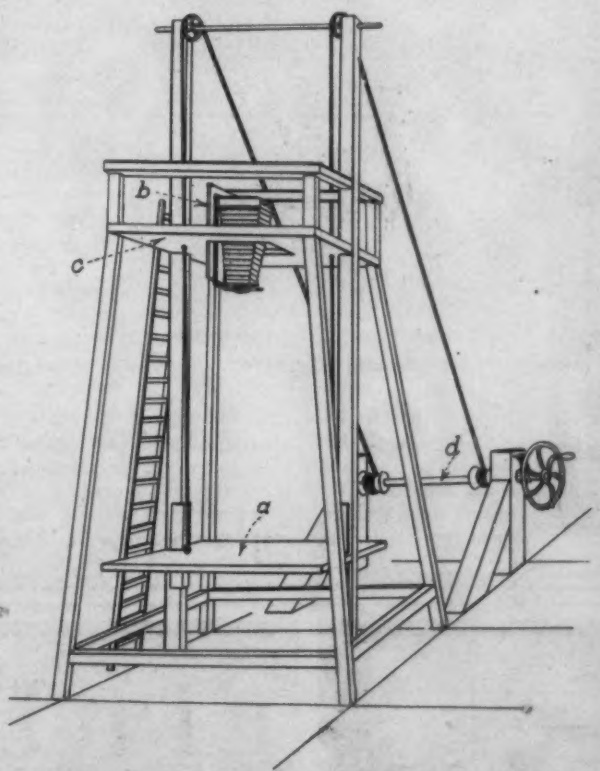


Fig. 1—Apparatus Used by Ingersoll-Rand Company for Making Duplicate Part Photographs

When it has been determined in the preparation of a catalogue what illustrations are to be used, the photographic department is authorized to take the necessary pictures, the detail and arrangement of the subjects being made to conform with instructions given with the order. Each particular line of machinery is photographed in the department producing it, and the shop engineers assist in arranging the machine and parts to insure the showing of all essential details.

In all shop photography many difficulties are encountered, and these are often accentuated in the case of the Ingersoll-Rand Company because its products include large machines which are too heavy to permit of easy rehandling. Consequently some machines must be photographed on the erecting floor just as assembled under conditions which are anything but satisfactory because of poor light, close quarters, etc. Under such circumstances a good lens, equally good judgment and a correct use of flashlight powder are essential to good results. The company's photographers also make use of a muslin or canvas curtain fastened on a wire and supported at either end by wooden poles 10 or 12 ft. high for a background as shown, for example, in Fig. 9. Flashlight powder and flashlight bags are located in such positions as will light up the dark recesses and bring out details. Here, it may be said, good shop photography requires an assortment of high-grade lenses to prevent distortion and get correct perspective. In their work of making pictures at close range the Ingersoll-Rand photographers use lenses averaging from 7 3/16 to 23⅛ in. in focal length. Figs. 5 and 6 show interiors of the Ingersoll-Rand plant reproduced for their excellent perspective effects.

Duplicate part photographs, used by some firms in the making of what are called "renewal sheets," involve another use of the camera in the making of shop pictures. In the production of these the Ingersoll-Rand Company uses an adjustable frame, Fig. 1, which has been found to work very successfully. The parts are arranged in proper rotation on platform *a*, and the camera is attached to support *b* on the platform *c*. To accommodate the changing quantities of parts on various pictures, platform *a* is made adjustable and can be raised or lowered by means of the windlass *d*, to suit conditions. It is advisable to locate a frame of this kind in the open so as to get the best light possible.

The value of the camera in the copy room of the publicity bureau is great as it is regarded as indispensable in reproducing. After the air brush artist completes a wash drawing it is sent to the copy room and photographed in a convenient size for distribution. Line drawings, tracings and retouched photographs are given the same treat-

Figs. 2 and 3—Photographs Taken in a Tennessee Coal Mine

ment. The room in which this work is done must have a sufficient number of windows to afford good lighting and the windows must be equipped with shades in order that the light may be controlled. Fig. 4 shows a camera stand used in the copy room and for so-called process work is declared to be a necessity. The tracings or drawings are

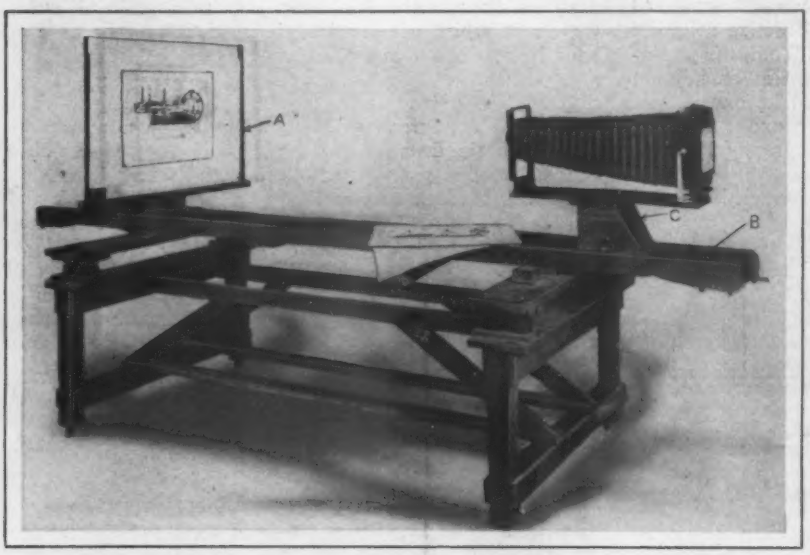


Fig. 4—Camera Stand Used for Reproducing Work

mounted on frame *a*, which is constructed to permit its being moved in any direction by means of conveniently located handles, making it easy to bring the axis of the lens into correct relation with the position of the subject. The stand is strongly made of 2-in. material with steel springs for absorbing the building vibration and heavy casters to allow of its being moved about with ease. The grooves in bed *b* are accurate in alignment so that the camera (which is mounted and fastened on frame *c*) and frame *a* can be moved back and forth with little effort.

A specially designed apparatus for producing bromide enlargements with daylight is shown in Fig. 10, its construction being not dissimilar to that of Fig. 1. The stand *a* is made adjustable and can be moved back and forth on bed *b* by means of handwheel *c*. The camera is mounted on platform *d* so that the back fits tightly in aperture *e*. A reflector *f* is constructed on a 45-deg. angle to reflect the light into aperture *e*, from which it passes through the negative, reflecting the image on sensitized paper mounted on board *g*. With the frame *a* adjustable, it is possible to produce any size enlargement, although an 18 x 22-in. size has been found large enough for most requirements. With this arrangement it is understood, of course, that no light falls on the sensitized paper save that which forms the image, the room otherwise being in total darkness.

In the production of catalogues for the company there is need for many power-house views showing installations of air compressors and underground photographs showing drills and other machines in operation in tunnels, subways and coal and metal mines. Underground photography presents many obstacles foreign to any other field, but while special apparatus has sometimes been found necessary, in a general way the only equipment needed is a good camera outfit and flashlight apparatus. In Figs. 2 and 3 are shown flashlight pictures of coal cutters (the Radialaxe in Fig. 3) taken in the mines of the Tennessee

Figs. 5 and 6—Views in Ingersoll-Rand Company's Works, Indicating the Magnitude of Its Compressor Production

Coal Company, Briceville, Tenn.

Lantern slides for use in lecture work such as the presentation of the subject of pneumatic tools in foundries and other industries are made in the copy room on a camera frame illustrated in Fig. 7. Two cameras, A and B, are placed on the frame with the fronts adjoining. The lens is mounted on camera A which is fitted with a special detachable back for holding the lantern slide plate holder. The 8 x 10-in. negative is placed in the back of camera B. Directly back of this and far enough away to be out of the focal range the copy board C reflects a uniform light on the negative from a white cardboard tacked to it. By proper manipulation of the two cameras the negative image is reduced and converted into a positive lantern-slide transparency.

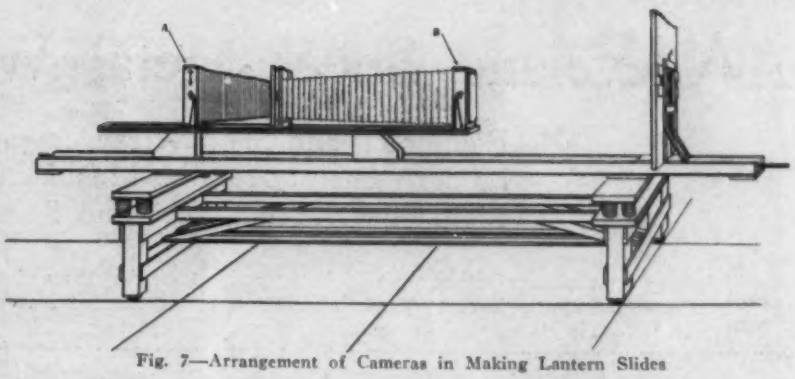


Fig. 7—Arrangement of Cameras in Making Lantern Slides

In Fig. 8 is shown the washroom of the photographic department where prints are washed, dried and trimmed. The washline apparatus mounted on the two poles will conveniently accommodate 200 8 x 10-in. prints if they are pinned on the line back to back.

The Winona Institute

The National Metal Trades Association, which for several years has been sponsor for a metal trades school at the Technical Institute (formerly Winona Institute), Indianapolis, has closed the school temporarily, having made a proposition to the Indianapolis School Board to take it over and conduct it, giving the machinery and equipment to the board, which is to have complete supervision, supply the instructors and pay the expenses. Action will be taken by the board as soon as it completes a canvass of the high school pupils of the city to learn what proportion of them would take the course offered at this school. The board is now conducting high and manual training courses at the school while litigation is pending in the Supreme Court of the State to determine whether the Technical Institute property shall be turned over to the city of Indianapolis. It has been in the hands of a receiver for a year or two and the Metal Trades Association found it difficult to induce students to enter the school for a three-year term without definite knowledge that they would be able to complete the course. The association has been setting aside $3000 a year to aid students not financially able to take the course and has furnished two instructors.

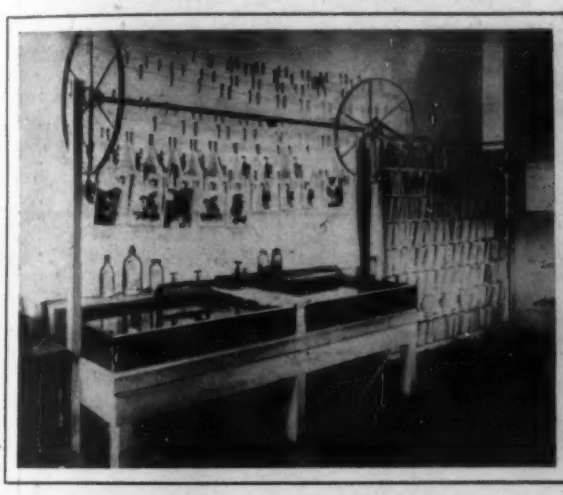


Fig. 8—Washing and Drying Equipment of Ingersoll-Rand Company's Photographic Department

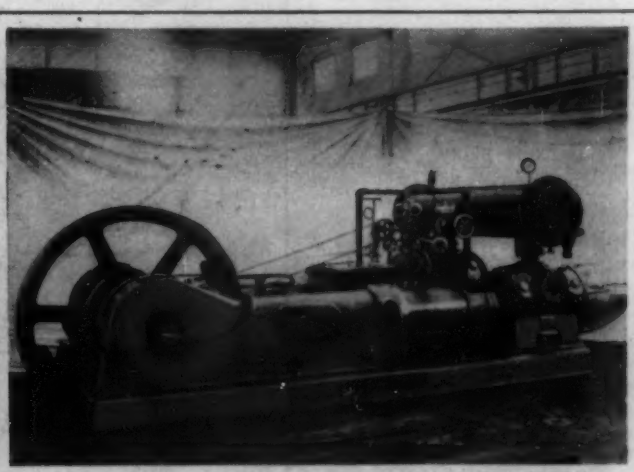


Fig. 9—Arrangement of Background Sheet in Crowded Quarters, When Photographing Heavy Machine

Summing up the matter of the camera in such pursuits as have been referred to in this and the previous article it may be said that an authority on military subjects said a dozen years ago that "photography is to play an important part among the auxiliaries of war," but true as the observation may have been, the camera plays a much larger and more important part as an auxiliary of the arts and sciences of peace.

Dr. Raymond C. Benner, chief fellow of the smoke investigation of the Department of Industrial Research, University of Pittsburgh, Pittsburgh, Pa., will deliver a lecture on the smoke problem before the New York Section of the Society of Chemical Industry at Rumford Hall, 50 East Forty-first street, on Friday evening, November 22.

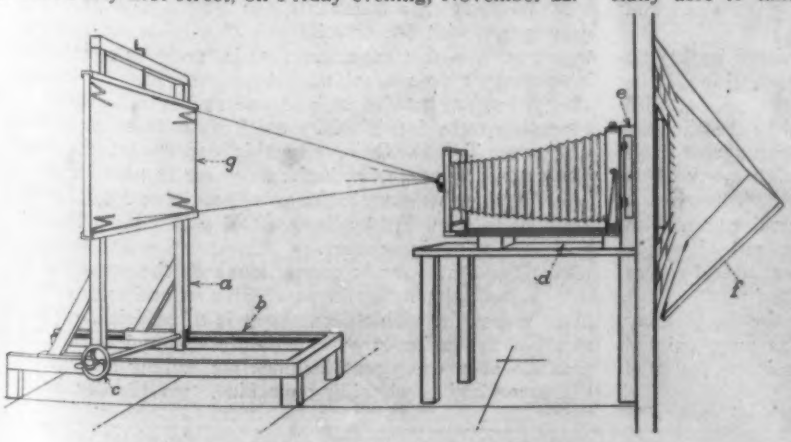


Fig. 10—Device for Making Bromide Enlargements

That the products of oxidation of sulphur, namely, sulphur dioxide and sulphur trioxide, in the fuels used by internal combustion engines, do not attack the iron of the engine unless they are dissolved in water and form sulphuric or sulphurous acid, was established in a recent article by E. Gräfe in Braunkohle. According to a translation in the November Journal of the American Society of Mechanical Engineers, the iron is strongly attacked where there is condensation of water, as in exhaust piping, but this may be prevented either by making the exhaust piping short or by lining it with lead.

A Cleveland Sheet Metal Working Plant

Equipment and Shop Arrangement of a Modern Factory for the Manufacture of Light Sheet Metal Work and Stampings

A new factory for the manufacture of light sheet metal work and stampings recently built by G. F. Mitchell & Son, Cleveland, Ohio, is of more than ordinary interest in that the owners in designing the plant aimed to make it as modern in every particular as possible and with shop arrangements and equipment which would enable them to bring out products of high quality at a minimum cost. With this end in view a number of original features were adopted. The plant was designed to make everything in the sheet metal line from sheet steel up to that ¼ in. in thickness. The principal products at present are sheet metal automobile parts, such as tool and battery boxes, mufflers, gasoline tanks, stampings and reinforced-concrete contractor supplies.

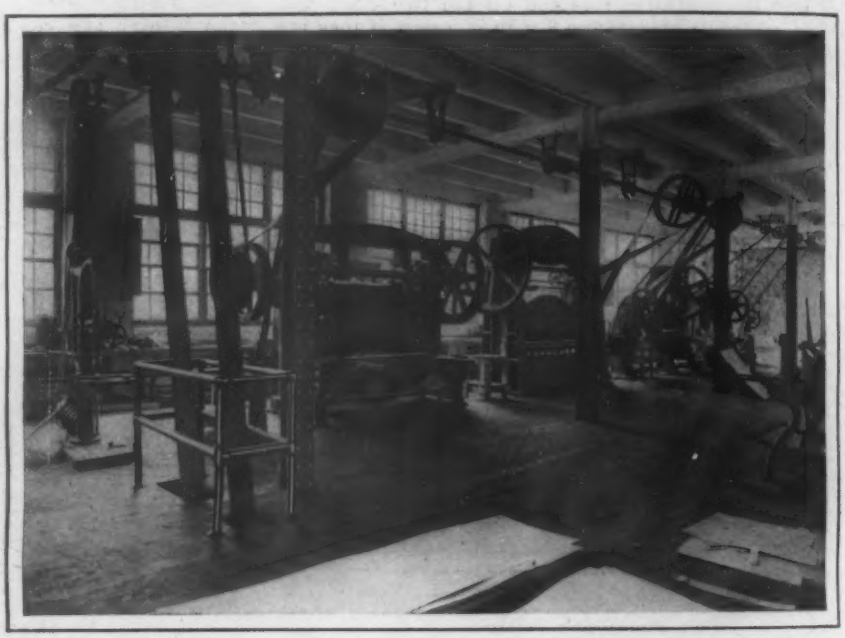
The plant is located at Cedar avenue and East Sixty-fifth street. The building is two stories high and 70 x 170 ft. A basement extends under a portion of the building in the rear. The structure was designed to allow the addition of more stories if needed and the erection of two additional stories in the near future is planned. All the first floor, with the exception of an office on the street front, is used for the stamping department. On the second floor is the sheet metal department. The heating plant and a room for the storage of dies are located in the basement. Expense was not spared in erecting the plant that would be ornamental as well as substantial and practical. The building is of brick, wood and steel construction. The street facings are of Hamburg shale brick laid in Flemish bond with a 5/8-in. raked joint and black Pecora cement. The entrance is of white sandstone with columns and capitals of Doric design. All windows, arch cappings, keystones and copings are also of white sandstone.

The factory floors are divided into three bays by two rows of steel columns spaced 20 ft. each way. The 16-in. steel girders employed are supported by T's attached to the columns. The girders support 12 x 6-in. wooden sleepers running lengthwise and carrying the floors. The floors are of 8-in. reinforced concrete with a 4-in. layer of cinder concrete and this is covered with 2-in. matched maple flooring. High ceilings aid in securing light and ventilation. The ceilings are 15 ft. high on the first floor and 12 ft. high on the second floor. The third and fourth floors are to have 12-ft. ceilings.

The maximum amount of light is admitted by having the windows extend the full length of each side of the building from the top of the benches to the ceiling, with the exception of a space 4 ft. wide occupied by the pilasters between each light bay. The windows, which are of ordinary glass, are 16 ft. wide, 12 ft. 6 in. high on the first floor and 9 ft. 6 in. high on the second floor. The window sashes are of special design with narrow trunnions and with counterweights on the end of the sash instead of at the center. Wood instead of metal sashes were used because it was feared that the acid used in the plant might prove injurious to the metal sash. In order to make the building as light as possible, the walls and ceilings were painted white. The only dark color in the room is on the steel columns, which are painted black.

The benches that extend the full length of each side wall are of interest because they are different in design from those usually used. They are of 3-in. maple laid in 16-ft. lengths and supported by double pedestal cast-iron legs that give a continuous bearing along their faces. These legs, which are unusually heavy, weighing 56 lb. each, are placed 8 ft. apart. To save time taken by workmen in going back and forth to a locker room a wooden locker is placed every 16 ft. against the pilasters at a convenient distance above the bench. Boxes fitted with locks are provided beneath the benches for small tools.

The ceilings are kept entirely free of wiring and piping. All wire and pipes are placed along the wall under the benches where they are practically out of sight. The



View in Stamping Room on First Floor Showing Machines

plant is served by an Otis 8 x 10-ft. 3-ton elevator. Material is unloaded at a rear entrance with a hand hoist.

Placed in a row on one side of the stamping department on the first floor and arranged to facilitate the handling of work is a complete stamping equipment of draw, stamping and toggle presses. The work done in this department ranges from the finest stampings, as fine as needles, to 4-in. drawn ware ¼ in. in thickness and 60 in. square. The stamping machinery is all driven from one line shaft direct belt connected to the engine in the basement.

The machinery in the stamping department includes a 97-in. shear weighing 14 tons for 3/8-in. cold rolled stock, with micrometer attachments for blades and gauges; a draw press with 6-in. stroke and 48 x 36-in. bed plate; a toggle press with a capacity of 14 in. draw on stock 10 in. in diameter; four blanking presses, one 22 x 30 in., one 18 x 36 in., one 12 x 18 in. and one 12 x 12 in. All of the foregoing were furnished by the Toledo Machine & Tool Company, Toledo, Ohio. In this department there are also a 12-ft. 6-in. cornice brake weighing 14 tons for drawing, shearing, bending, braking, etc., and one 2½-ft. power brake, both furnished by Geo. A. Ohl & Co., and a Horning press for trimming covers.

On the first floor in connection with the press department is a machine shop in which all dies and tools for the plant are made. This department is of sufficient capacity to allow the taking-in of outside die and tool work. The machine shop equipment includes six drilling machines, a Cincinnati universal milling machine, two Hendey lathes, three Van Wyk shaping machines and two universal grinding machines. At present stocks are stored on the floor, but a mezzanine floor is to be built shortly above the press

and die room. In this will be arranged storage racks for stock.

In the sheet metal department on the second floor there are five sets of Toledo shearing machines ranging from a

View in Sheet Metal Department on Second Floor

15-ton power machine capable of cutting ¼-in. stock 97 in. at one stroke and other shearing machines for lighter gauges have a range of 60 to 28 in. In the forming department there are Niagara power rolls 56 in. long and 6 in. in diameter, a Niagara power seaming machine with a capacity of 40 in. and the usual hand-power tools. No hand riveting is done in the plant. All riveting of uncoated sheets is done by 15-kw. spot-welding machines made by the National Welding Company, Warren, Ohio. Two Swaine power magazine riveting machines are used for work on galvanized and wet finished steel.

Air for each bench is supplied from a 2-in. air line which also furnishes air for gas furnaces equipped with Grimm burners. Air is mixed with gas outside of the furnace pots, the heat being intensified by combining air with the gas. The air supply is obtained from an American Blower Company's positive blower.

The power equipment consists of a 150-hp. Elyria horizontal gas engine direct connected to a 60-kva. 110-volt Western Electric generator with an 8-hp. exciter. The generator produces alternating current for the high power machinery and for the spot welder. With an exciter increased from the 1½-hp. size which would usually be used to the 8-hp. size, sufficient direct current is generated to light the factory and furnish power for the small direct-current power machinery.

The plant is heated by a sectional boiler made by the Sun Ray Mfg. Company. It is located in the basement and supplies 5800 sq. ft. of radiation. The heating pipes are placed along the walls under the benches. The heating plant is intended to keep the factory at a temperature of 65 deg. in zero weather. The boiler and piping are covered with asbestos.

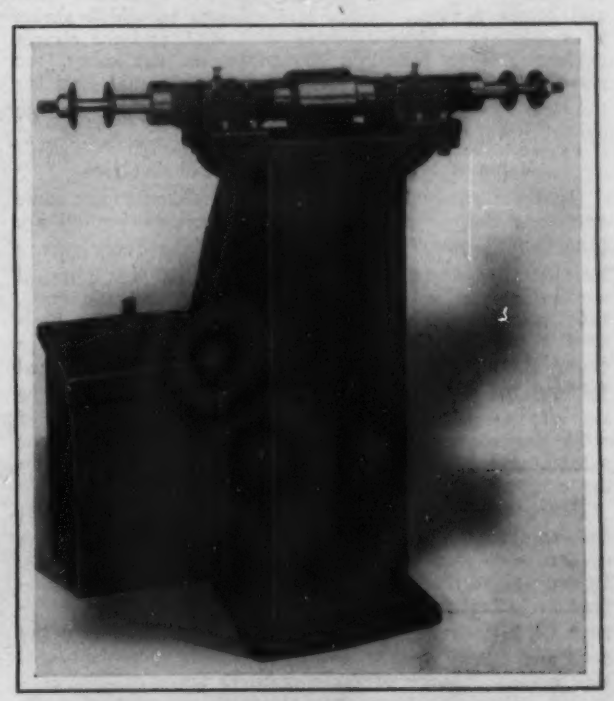
Artificial lighting is furnished by one row of 100-watt Mazda lamps with reflectors, suspended from the ceilings in the center bays and spaced 20 ft. apart and rows of 40-watt lamps in the side bays suspended over the benches 8 ft. apart. As a protection against fire the factory is equipped with two 4-in. water standpipes and 300 ft. of hose on each floor. Well equipped toilet rooms are on the second floor.

The business is conducted by G. R. and H. W. Mitchell, two brothers, who founded it after graduating from Harvard and Dartmouth six years ago. Without previous experience they made a modest start in a downtown block. Constant application and attention to the needs of the trade have rewarded them with success and the growth of their business, that requires a much greater capacity than they previously had, has enabled them to build the new plant into which the business was recently moved.

High Speed Motor-Driven Buffing Lathe

A high-speed, motor-driven buffing lathe has been brought out by the Northampton Emery Wheel Company, Leeds, Mass., for very rapid and accurate buffing and polishing work. The motor which is totally inclosed in the base is bolted to an adjustable bed having a vertical adjustment of 4 in. so that when the bed is lowered by an adjusting screw any slack in the belt is taken out. In this way idler pulleys are done away with.

The spindle which is of crucible steel is ground to a fit in the bearings. Special spindles are furnished for any particular kind of work such as tap and reamer flute grinding, etc. The bearings are bored and fitted with babbitt liners and are of the ring-oiling, reservoir take-up type, which is said to insure absence of heating under high speeds, the maximum permissible speed being 5800 r.p.m. A 2-hp. motor is recommended for driving the lathe and by changing the pulley on the motor the speed of the spindle can be varied. The babbitt liners are of a somewhat unusual design. The box and cap are bored and into them are sunk vertical holes, which act as anchors for corresponding lugs on the liners. When



A New High Speed Motor-Driven Buffing Lathe Built by the Northampton Emery Wheel Company, Leeds, Mass.

they have become worn beyond the permitted limits, the liners are pried out easily and new ones slipped in, no chipping being required.

The following table gives the principal dimensions and specifications of the lathe:

Floor space, in.	27½ × 23½
Hight to center of arbor, in.	20¾
Over-all length of arbor, in.	40
Distance between wheels, in.	31½
Length of bearings, in.	8½
Diameter of arbor in bearings, in.	1½
Diameter of arbor in flanges, in.	¾
Size of pulley on arbor, in.	4 × 4
Diameter of vertical adjusting screw, in.	⅞
Shipping weight, exclusive of motor, lb.	600

The equipment of the machine includes dustproof collars at both ends of each bearing.

Microscopical Analysis of Steel Sheets*

How Shortcomings in Mill Operations Lead to Avoidable Defects of Which the Microscope Serves as the Telltale

BY C. ARTHUR WHITE.†

(With Supplement.)

Steel for the manufacture of sheets should be of the highest possible grade of soft steel; a fact, I fear, not fully appreciated or acquiesced in by the average maker of steel for this purpose. A better understanding and fuller appreciation of this fact will no doubt result from careful consideration of only a few important features.

Commercial steel sheets vary in thickness from 0.0061 in. (which is No. 38 gauge) up to and including, we may say for our present purpose, 0.14 in. or No. 10 gauge, and the surface area varies from 6 to 50 sq. ft. These sheets are, of course, used for various purposes, and ignoring the quantity used for roofing and siding and various covering purposes, the product enters into many diversified channels and is subjected to extremely hard physical tests. It is drawn, stamped, pressed and distorted into every conceivable form and shape, the wonder being that more failures or failures in larger quantities are not in evidence.

In addition to the severe service requirements for purposes just enumerated, which represent a large tonnage, another large tonnage enters into the manufacture of highly surfaced and polished products, wherein almost the slightest surface defect or irregularity will condemn the product. This class includes stock for automobile manufacture, metallic furniture and various other kindred requirements. In view, therefore, of the diversified uses and severe physical strains and stresses to which sheets as a rule are subjected on the one hand, and the almost perfect surface condition demanded on the other, the statement made a few moments ago, namely, that steel for the manufacture of sheets should be of the highest possible grade, is fully warranted.

Value of Microscopic and Chemical Analyses

Inherent physical defects are not protected to the same extent as they would be in heavier sections, but all are practically brought to the surface; and as every square inch of the sheets is subject to inspection for physical surface defects or to mechanical working and distortion, this statement I think will not be found too strong. Failures in the character of product, when studied from a chemical standpoint, have not been satisfactorily accounted for, but for some time efforts directed to this end by the use of the microscope and the microscopical study of steel sheets generally have thrown much light on the subject and promise considerable advancement and improvement in the future.

By a study of steel sheets microscopically, inherent defects are quite readily discernible, and the distribution of the various metalloids is made quite plain and clear. In addition to this the physical structure and relative proportions of constituents present; grain size and the influence of various heat treatments are all brought into the open and clearly defined, and can be made to return valuable results. Some of these features and peculiarities I hope to show in the microphotographs of certain specimens. [Reproduced on accompanying supplemental plate.] The application of the microscope to steel sheets proper has probably not yet progressed to any great extent, and if this short paper and the photographs will stimulate efforts in this direction it will have probably accomplished all that can be expected.

It has been my privilege to be associated with a sheet steel manufacturing plant having an open-hearth department devoted entirely to the manufacture of steel for sheet purposes. What is of supreme importance in the application of the microscope is to show the chief constituents of the metal, how combined, the relative size and mode of arrangement in the steel. It is admitted that metallography has its limits and can never be made to replace chemical analysis, and in this view I acquiesce. It is, however, the only means at hand whereby the internal irregularities, such as rupture, physical arrangement of crystals, etc., can be determined. Chemical analysis does not disclose these, nor does it disclose cleavage lines and physical imperfections readily discernible by the microscope; and while chemical analysis is of prime importance, we believe we approach nearer to the actual conditions by combining with chemistry the science of metallography.

Clean, Solid Ingots for Sheet Manufacture

The chief aim of the steel maker should be to produce clean, solid ingots, as free from segregation as is possible under the best and most approved methods. Oxidized steel, such as is regularly produced from very many causes, is extremely objectionable from every standpoint for the manufacture of sheets, it being physically weak, carrying a maximum amount of surface defects in its finished form and being peculiarly susceptible to injury when exposed to certain finishing treatments.

One cause frequently contributing to the production of oxidized steel is its manufacture with a slag covering of too thin consistency, or of a depth too shallow to properly protect the metal, in which event the temperature throughout the process, particularly at the end of the process, is too high, causing the slag to carry a high oxygen content, which contributes to the oxidation of the metal in contact with it.

Another prolific cause of trouble is the improper feeding of ore which is added from time to time for reducing purposes, particularly the last additions, which are sometimes made in too great quantities, or after which sufficient time is not allowed to work out thoroughly all the impregnated gases and oxides. Such heats will not produce sheets of good quality, which will be in evidence more as light gauges are produced.

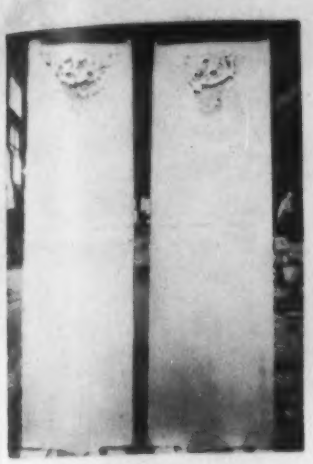
Desirability of Ingots with Heavy Protecting Skin

The best made low-carbon steels under proper furnace practice and manipulation will undoubtedly occlude certain gases which form blow-holes, and the casting temperature is unquestionably an important factor governing their position, size and extent throughout the ingot. Steel cast at a very high temperature usually shows these blow-holes near the surface and only protected from oxidation by a very thin skin of metal. While steel cast at too low a temperature solidifies too quickly, there is the probability of occluding considerable quantities of gas due to the rapid solidification, these gases being sealed in the steel and their escape made impossible. There is in this, as in all operations, however, a happy medium; when the steel is properly made and casting done at the proper temperature it is possible, by the segregation of the impurities and gases, to localize these cavities in a pipe near the top, which, if eliminated, as should be the case, by proper cropping, leaves highly satisfactory material.

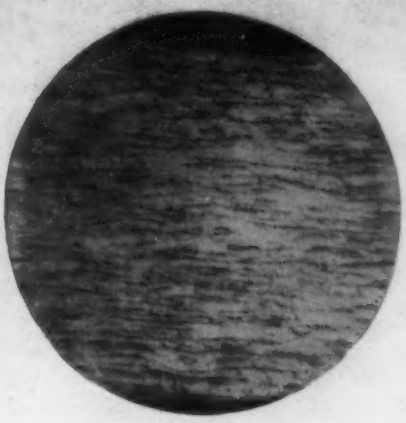
Low-carbon steels, highly oxidized due to improper furnace treatment, are certain to carry blow-holes and a honey-combed structure near the surface which are only protected by a very thin skin of metal. The ideal condition is to produce ingots having a skin as heavy as possible to protect against further oxidation. The use of various elements, such as aluminum, silicon, etc., to correct evils of this character can probably be seriously questioned. The thought which should be uppermost in the minds of the steel makers, and which is probably too often neglected, is the aim to produce well made steel, properly treated throughout the various operations, rather than to depend on a deoxidizer to overcome or correct bad results which would never have been in evidence under proper practice.

*A paper read at the Pittsburgh meeting of the American Iron and Steel Institute, October 25, 1912.

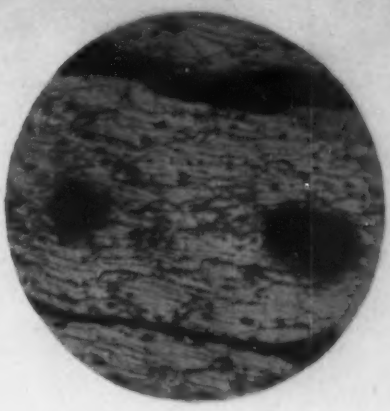
†American Sheet & Tin Plate Company, Vandergrift, Pa.



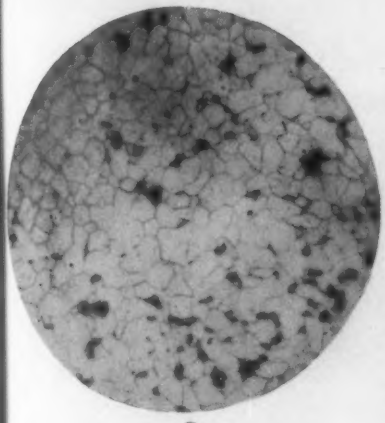
1



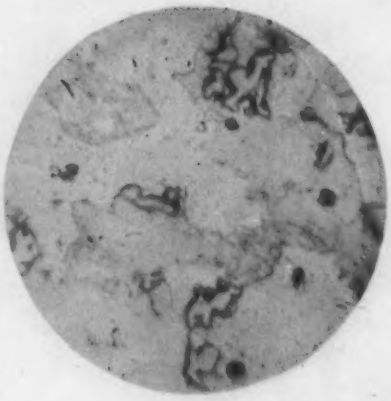
7



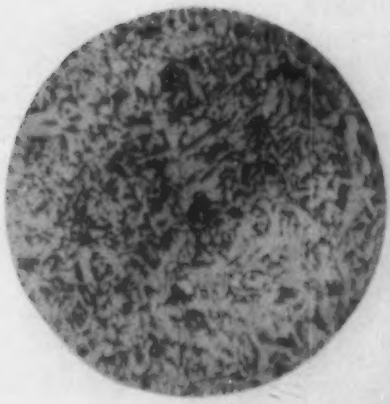
8



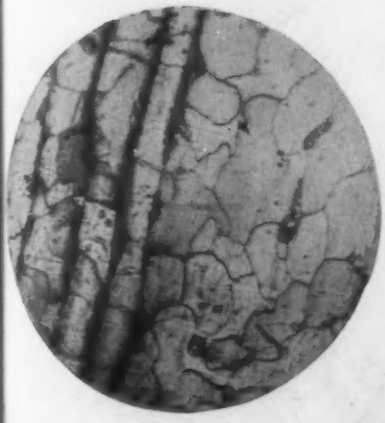
5



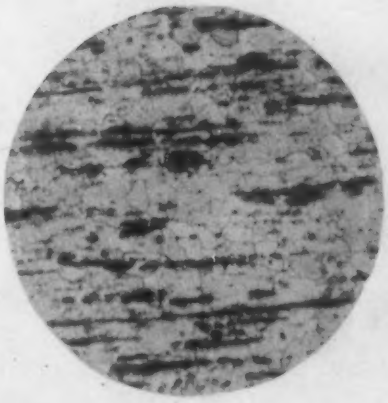
9



10

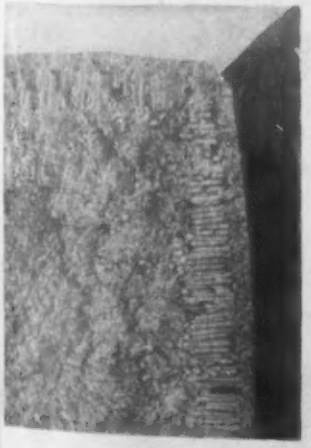


6

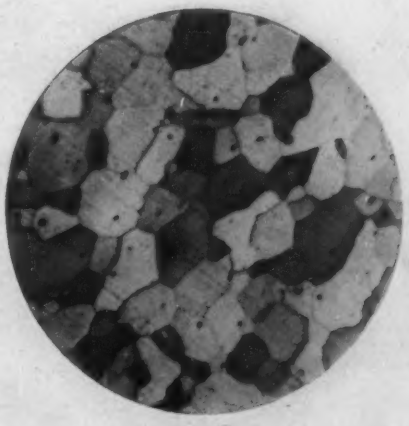


11

12



3



13

14

1—A 16 x 18-in. low-carbon steel ingot, split thwise, cast from a properly made heat and hed into sheets of good quality.

2—A 16 x 18-in. low-carbon steel ingot, split thwise, cast from an oxidized heat that re- ed in poor quality sheets.

3—A transverse section of an ingot, showing honey-combed portion and the skin that pro- s it from oxidation. If properly heated and ked, such an ingot can be finished into sheets ood surface and physical qualities.

4—A transverse section of an ingot, showing the honey-combed section with a very thin skin of metal on the surface. This type of ingot invariably produces a bad surface and is weak physically when finished into sheets.

5—An edge view of a ½-in. thick sheet bar, rolled from a well-made and properly cast ingot—a clean and homogeneous structure.

6—An edge view of a ½-in. thick sheet bar, rolled from an ingot of oxidized steel, showing seams and oxides.

7—An edge view of a 29-gauge sheet rolled from a heat of steel that gave good surface and physical qualities. Unannealed, showing strains.

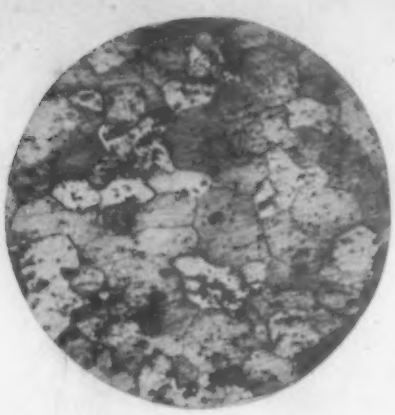
8—An edge view of a 29-gauge sheet from an oxidized steel. Unannealed, s rolling strains and imbedded oxides.

9—A 16-gauge box-annealed sheet, sho large grain and the carbon existing as ca collected between the junction lines of the

10—A 16-gauge open-annealed sheet sho small grain and the carbon existing as pearl uniformly distributed throughout the struc

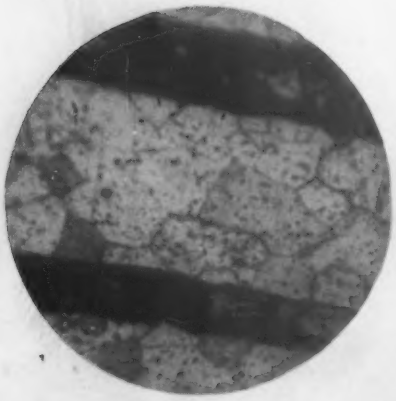
11—A surface view of a 28-gauge she

PHOTOMICROGRAPHS OF STEEL SHEETS PRESENTED BEFORE THE AMERICAN IRON AND STEEL INSTITUTE BY C.

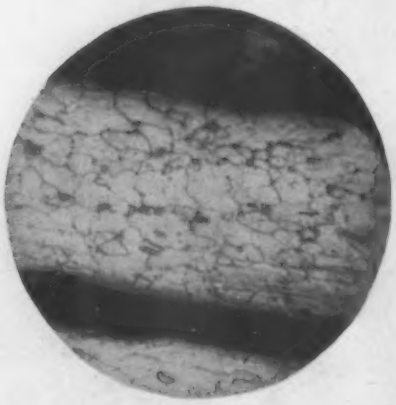


15

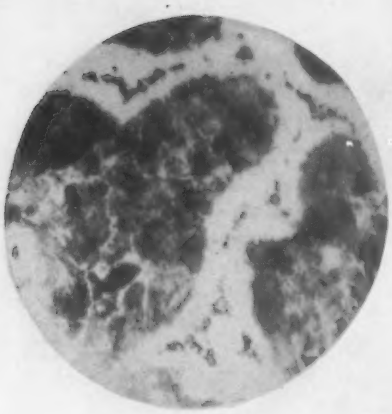
2



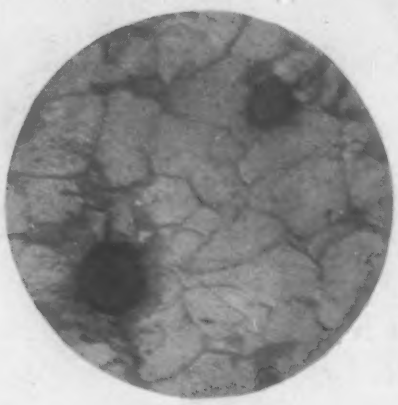
16



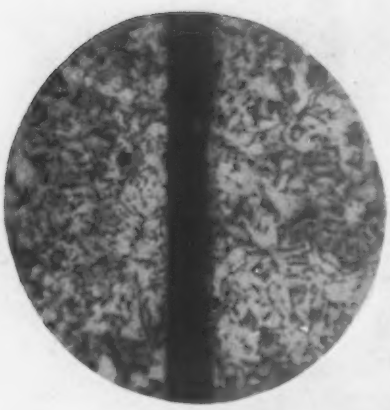
17



19



18



20

4

nealed showing oxides and very soluble in the pickle bath.

12—Surface view of the sheet after pickling, showing blisters.

13—A surface view of a 30-gauge sheet used for electrical purposes having a high permeability and low iron loss.

14—An edge view of the sheet shown in 13.

15—A surface view of a 30-gauge electrical sheet having a low permeability and a high iron loss, due to oxides.

16—An edge view of the sheet shown in 15.

17—An edge view of a 26-gauge sheet, box annealed, showing a uniform structure free from oxides and very ductile.

18—Slag imbedded in the surface of a box-annealed sheet.

19—A surface view of a very brittle piece of steel showing portions highly carburized. The white parts are pure iron with manganese sulphide inclusions.

20—Edge view of a 16-gauge open-annealed sheet.

HUR WHITE, AMERICAN SHEET & TIN PLATE COMPANY, VANDERGRIFT, PA.

Use of Deoxidizers Not Viewed with Favor

It is undoubtedly better for all concerned to have the steel properly made, rather than to carry on this operation in a more or less careless manner, feeling secure in the belief that some element will be added at the finish of the operation to overcome a condition which should never have been present. And I believe it is a safe position to take, and one that cannot be seriously questioned, that material or steel produced without the necessity for additions of aluminum, silicon or other deoxidizers, is vastly superior to steel obtained by their use, having in mind that furnace operators feel that the addition of a deoxidizer at the end of the operation will correct all furnace irregularities. Such a mistaken impression undoubtedly tends to many irregularities in the finished product and probably gives rise to the belief that we are justified in hurrying or forcing the production of furnaces in the interest of tonnage. This I personally believe to be absolutely wrong, and one of the fatal mistakes daily made in some of the large steel producing plants. Nor do we feel that quality can be maintained and the production forced beyond a reasonable point.

Treatment of Ingots in the Soaking Pits

Importance should be attached to the complete solidification of the metal in the molds prior to stripping and delivering to the soaking pits. This in a measure prevents hot cracks in stripping and overcomes shrinkage cracks to a large extent if performed at the proper time. Care should be taken to soak the ingots to the desired temperature and in a reducing atmosphere, and the practice of using soaking pits as heating furnaces under oxidizing conditions should be avoided, since in oxidizing atmospheres the skin of the ingot will be destroyed, exposing the honey-combed cells, which will in later operations be further oxidized and in contact with the rolls will absorb dirt and oxide to the future detriment of the product.

Ingots which have been wasted to this extent will never produce a satisfactory product in sheet form and while the cracks and rough scabby surface may in a measure be healed over in the future bar mill operations, these will all again be disclosed as the material is reduced to the thinness of sheets, and they will be in evidence as laminations and scabby surface conditions not susceptible to a satisfactory finish in sheet form. And aside from general surface appearance, the material is far from being physically up to the proper standard, interfering with drawing and stamping operations, as well as future coating operations, if such are desired.

Removal of Loose Scale in Sheet Mills

Sheet mill practices as carried on at various points may be susceptible to some criticism, principally, I feel after careful study, due to the lack of cleanliness in the removal of such loose scale as is produced more or less under the best practice. The loose scale results at times in surface defects which may be unfairly attributed to the steel proper. The various operations in this line of work are of course important, proper heating to prevent excess scaling being of paramount importance. The probability of overheating is, I feel, very remote, and almost negligible, due to the maintenance of reducing atmospheres and the short duration of the heating period.

In the manufacture of sheets two methods of annealing are followed. These are known as box or tight annealing and open annealing. In the former the sheets are protected from direct contact with the flame by being enclosed in air-tight steel lids resting on flat bottoms and carefully sealed with sand. In open annealing, which is carried on almost entirely on heavy gauge sheets, the sheets are placed in the furnace and are subjected to direct and intimate contact with the flame itself. This method is pursued largely in the manufacture of heavy gauge sheets to overcome the danger of crystallization which takes place quite frequently in heavy gauges when box annealed. Proper temperatures for this part of the operation are determined by gauge, size and volume of the sheets entering into the operation, as well as the peculiar needs or requirements of the various customers. The equipment should be kept in good condition to prevent air entering or coming in contact with the material during the heating and cooling periods, as this causes oxidation on the edges of the sheets to their future detriment.

The Pickling Bath as an Exhibitor of Defects

In the process of pickling, which is carried on in a weak solution of sulphuric acid, probably more than in any other are the inherent weaknesses of the steel in evidence. All laminations and physical defects are stripped of their covering of oxide, and what was apparently a minute defect becomes glaring after this operation. It is here also that oxidized steel is readily discernible. Sheets produced from a thoroughly good quality of steel are but slightly soluble in acid in this operation, whereas those highly oxidized are shown to be distinctly soluble.

The reaction between the acid and sheets unquestionably generates large volumes of hydrogen gas which the sheet absorbs. This in turn reduces the oxides present, forming spongy iron and water vapor and develops blisters. The sheet is left in a correspondingly weak porous condition due primarily to these inherent defects. Very many internal defects which would never become apparent in the black sheet proper are brought decidedly in evidence by the pickling operation.

It is recognized by sheet makers generally that all steel is predisposed to blister and will dissolve on exposure to sulphuric acid. The constant aim in this operation is, and should be, a minimum exposure to the action of the acid consistent with the proper cleansing of the surface.

New York City's Industrial Upbuilding

The Merchants' Association, 54 Lafayette street, New York, has established an industrial bureau which will devote its time and energy to the industrial upbuilding of New York City. The members of the association have at last decided to make a vigorous effort to counteract the so-called raids made on New York by other cities. Manufacturers, wholesalers and practically all other classes of business men have been coaxed from New York by cities offering free docks, free sites for factories, free power or the remission of taxes for a number of years. Within the limits of the city of New York are thousands of acres of unoccupied land suitable for factory sites or for warehouse purposes, having advantages of both water and rail transportation.

Correction.—On page 1070 of the issue of *The Iron Age* of October 31 a paragraph was printed stating that the Calumet Foundry Equipment Company, Harvey, Ill., had been sold to James Pettigrew. The company informs us that this statement is incorrect. Mr. Pettigrew purchased only the foundry and pattern shop. The remainder of the plant will continue to be operated as heretofore under the name of Calumet Foundry Equipment Company, manufacturing a complete line of foundry equipment as well as electric and hand power traveling cranes.

The National Industrial Traffic League will hold its annual meeting at the La Salle Hotel, Chicago, November 14 at 10 a. m. At this meeting officers will be elected, reports from officers will be received and such subjects will be considered as bills of lading, uniform classification, interpretation of demurrage rules, railroad rules as to storage of freight, etc. The president of this association is J. M. Belleville, general freight agent of the Pittsburgh Plate Glass Company. The vice-president is H. G. Wilson, commissioner of the Transportation Bureau of the Commercial Club, Kansas City, Mo. The secretary-treasurer is W. D. Hurlbut, 28 Jackson boulevard, Chicago. The association is composed of representatives of traffic departments of manufacturers and merchants and representatives of commercial clubs and other trade associations.

The Bessemer Gas Engine Company, Grove City, Pa., has purchased the gas engine business of the Middleditch Engine Company, Detroit, Mich., including its stock of engines, patterns, jigs and patents. In addition it has bought the patents of John and F. O. Peterson, covering the Universal fuel feed, which enables small engines to operate successfully on kerosene, naphtha and low grade distillates. The Bessemer Gas Engine Company has felt the need for some time of a line of small engines to make its line more complete, and this purchase gives it a full range of gas engines from 2 to 350 hp.

The Talbot Process of Improving Ingots

The Promise with Fluid Compression in the Blooming Mill of Producing Pipeless Rails with Minimum Cropping of the Metal

Benjamin Talbot of Middlesbrough, England, best known as the inventor of the Talbot continuous open-hearth steel process, gave further details in New York on November 7 of his discovery of the advantages of passing the fresh ingot a few times through the blooming mill while the ingot interior is still fluid and of the promise of rails rolled from such ingots after the usual stay in the soaking pits. The information was given in the form of a brief paper, presented before an informal meeting of the iron and steel section of the American Institute of Mining Engineers, attended by prominent representatives of steel companies and important railroad systems of the country. The main points of the discovery and an explanation of the phenomena were given in *The Iron Age* of October 17, through an announcement made by Dr. J. E. Stead, at the Leeds, England, meeting of the Iron and Steel Institute, on October 1. Through the meeting of last Thursday evening, however, which was held in the rooms of the American Institute of Mining Engineers in the Engineering Societies Building, it is possible to add considerable to the information already printed and to give a line on the way the discovery is received in this country.

The meeting was made possible through the activities of William R. Webster, consulting engineer, Philadelphia, who felt that an early opportunity should be made for Mr. Talbot to explain the discovery before a gathering of those most vitally interested in it, and it is understood that Mr. Talbot's paper is to be amplified and printed with the numerous interesting photographs which he displayed at the meeting, in an early issue of the journal of the Institute. Charles Kirchhoff presided as chairman of the meeting, and Bradley Stoughton served as secretary. Immediately following will be found Mr. Talbot's paper, and succeeding this a report of the discussion, and also some tables, one giving the chemical analyses of rails rolled from different parts of an ingot treated in accordance with the Talbot method, and, finally, a table of tensile tests made of material taken from the rails.

Mr. Kirchhoff in introducing Mr. Talbot referred felicitously to his first meeting Mr. Talbot in Chattanooga about 22 years ago, when Mr. Talbot was engaged in attempting to manufacture steel from the then refractory Southern metal, and he mentioned how later, at Pencoyd, Mr. Talbot's efforts had been crowned with success, earning both fame and fortune, and leading to a return to England to retire, though the retirement did not last long. He was now about to speak, Mr. Kirchhoff added, of another epoch-making invention.

Mr. Talbot's Paper

The problem of segregation and cavities in steel ingots is a subject which has given and is still giving metallurgists, engineers and operators matter for serious consideration. This question has come more into prominence lately in this country, due largely from the desire of railroad engineers to secure a better rail than they have obtained in the past, as the service they now demand is increasing in severity, and no doubt manufacturers will be able to meet what is required of them. The rails here are as good as those made in other countries, but the conditions of service and the extremes of climate are more severe and consequently more breakages occur.

Various reasons have been advanced as to why rails may not be as good in quality today as in the past. Some engineers consider that modern methods of manufacturing, designed chiefly to obtain large output, tend to reduce the standard of excellence of more deliberate methods. Others think that 4-ton ingots are worse than those of 2 tons. Again, it is stated that the 100-ton heat in one ladle is too large and is a step in the wrong direction in casting.

The Size of the Ingot

My experience on the question of the size of the ingot is that in rolling rails of 85 to 100 lb. sections, the range of ingot is only practically such that the difference in the size does not help in the question of segregation, cavities or blow-holes. At Pencoyd, Pa., some 16 years ago, two ingots were bottom poured, cast at the same time from the same center runner. One was 20 x 24 in. and the other 13 x 16 in. in size. The steel was acid open-hearth, the carbon being 0.43, phosphorus 0.062, sulphur 0.069. At the same place in each ingot where segregation generally concentrates I found 0.67 carbon, phosphorus 0.13, sulphur 0.18 in the larger ingot, and 0.74 carbon, phosphorus 0.16, sulphur 0.27 in the smaller one. Bottom pouring at that time was considered better for surface defects, but there were blow-holes all up the surface of the ingot, and the smaller ingot in my opinion was worse in every respect than its larger neighbor.

Large Ladle Heats Not Favored

The question of 100-ton ladle heats is an important matter. In my opinion this is distinctly a step in the wrong direction, as it puts a premium on careless and slovenly casting work. We find that in order to empty a 100-ton ladle in the necessary time to prevent skulling very large nozzles are used, probably as large as 2.5 in. in diameter. The pressure of this large quantity of steel rapidly enlarges the nozzle and it would be interesting to know what size the nozzle is when the last portion of the heat is poured. Anyway, large nozzles cause heavy washing up the sides of the molds and this gives surface defects. There is no doubt smaller ladle heats, poured with as small a nozzle as the heat will permit, give the most satisfactory results.

We now come to the question of producing sound steel ingots for the heavy trades. There are various methods but we are forced to rule out the old and well-known Whitworth & Harmet press, because of the cost of the process. Others, among whom is Sir Robert Hadfield, suggest the use of a sink head to feed the pipe which forms by the shrinkage of metal from its liquid to its solid state. To do this effectively some system of keeping the surface fluid must be adopted. There is no doubt that if this is carried out the sink head will feed the ingot and the cavity will be in the head. The question to be decided with this method is whether it is commercially applicable to the large output required from a modern rail-mill.

The Talbot Procedure

An ingot at least 20 x 24 in. is used. Aluminum, 2 oz. per ton of steel, is added as ingot is being poured. The ingot can be stripped early and it is put into the soaking pit to allow envelope to become thicker and have a proper surface temperature for compression. A 20 x 24-in. ingot is then reduced in the blooming mill to about 18 x 18 in. It is returned to the soaking pit for a proper heating and solidifying of the mass. It is finally rolled into a bloom which is then cropped and the bloom is ready, for example, for the rail mills. The final rolled product has the same characteristic formation as the squeezed ingot—hard working face, harder ring back of this and softer center.

Amounts of Deoxidizer to Eliminate Blow-holes

Sound ingots as regards the elimination of blow-holes are produced by means of the well-known powerful deoxidizers, aluminum, silicon and ferrotitanium. All these deoxidizers have the same effect, when used in the necessary varying quantities to produce this. They all produce solid steel except for the large central cavity. They all diminish segregation. In my experience I have found with well-made steel that an addition of 2 oz. to the ton of aluminum is equal to 0.25 per cent. of added silicon, and an addition of 0.10 per cent. of metallic titanium in the form of ferrotitanium. These additions will all produce the same characteristic central pipe, and if they are used this piped portion should be discarded in each case.

If the rails are milled at each end, which gives a bright surface, as is the practice in England, the pipe is disclosed and the rail rejected by the inspectors. The cost of the aluminum addition is very small; with silicon it is considerable, and with ferrotitanium it is large, to obtain the same result. If it were not for this large cavity, which may affect as much as 33 per cent. of the ingot, the use of these deoxidizers would improve the quality of the finished rail; but owing to this, they are not used to such an extent as to create this.

It occurred to me that if we were to use a deoxidizer such as aluminum to eliminate blow-holes in the outer envelope of the ingot and then reduce the area of the ingot or the top portion, while the center was liquid, the pipe would not form and a solid mass would be found in the body of the squeezed ingot.

Peculiar Segregation Resulting from Squeezing Ingots

In analyzing and taking sulphur prints off the face of the compressed ingot, which was cut longitudinally through its center, I came across an interesting discovery. I found that whenever an ingot was compressed while its center was liquid, no segregation formed in the center of the upper part as is usual, but that it was driven to the internal face of the solid envelope in fairly regular percentage over the entire length of the liquid area. The solid outer envelope is the normal steel of the heat and is about 3 in. The carbon in this portion in this case is from 0.65 to 0.70; the carbon in the harder portion next this is from 0.75 to 0.80, and in the center about 0.50. The sulphur and phosphorus also vary in these strata, but as the phosphorus is low in this steel it was not of sufficient amount to be considered.

In ingots compressed while their center is liquid without the use of a deoxidizer, I find that the center shrinkage cavity is not formed, but that the blow-holes, which are found in the outer envelope, are not obliterated and can be traced into the rail. For this reason I prefer to use a deoxidizer so as not to have any surface blow-holes, which tend to give spongy rails.

How the Ingots Are Handled

The method of procedure is as follows: An ingot of at least 20 x 24 in. in cross section is used; 2 oz. of aluminum to the ton of steel is added to the ingot as it is being poured. Aluminum is preferred because of its low cost and its low melting-point. It causes a perfectly solid outer envelope to be formed, and solidifies the metal earlier than if no deoxidizer were used. The ingot therefore can be stripped earlier, and it is then put into the soaking pit to allow the envelope to become thicker, and at the same time have a proper temperature upon its surface for compression. A 20 x 24 in. ingot is reduced to about 18 x 18 in., and it is then returned to the soaking-pit for a proper heating and solidifying of the mass. After this has been accomplished, it is rolled down into a bloom, cropped and passed to the rail-mill. The rail produced has the same characteristic formation as the squeezed ingot, viz., a hard working-face, harder ring at back of this and softer center.

It is the question of this new formation that we manufacturers have to discuss with railroad engineers and metallurgists. If they accept this new structure with the guarantee that in this formation they have no pipe in a rail, then it will be for manufacturers to consider laying down the necessary preparatory plant to accomplish the liquid compression of the ingot, as it cannot be properly accomplished in any existing rail-mill without largely decreasing the output.

So far the rails produced by this method have been tested under the drop to the British standard specifications and they pass this satisfactorily.

The question of taking tensile tests out of the head has still to be considered, as these will vary, as they do today, according to the position selected. In fact, small tensile tests are unsatisfactory at the best, and it would appear that the only satisfactory method would be to have the testing-machine large enough to pull the full-sized head.

The Discussion

Dr. Henry M. Howe opened the discussion. He regarded the method of closing up the pipe as the cheapest possible means and suggested that metallurgists generally must feel like clubbing themselves because they did not think of the method before. He was puzzled regarding the relatively soft core of the ingot. The outside of the ingot gave the ladle analysis, while the center was lower than the ladle analysis, a very extraordinary condition. He admitted that he could not understand how the great volume of the center is so much lower in carbon, for example, than the shell, and felt that an explanation was very much needed.

Rolling Green Ingots

Mr. Talbot in reply to Dr. Howe said that the peculiar condition of the interior of the ingot was confirmed by a large number of trials of the process. He stated that only a few passes through the blooming mill is necessary, but one must not let the ingot bulge. He agreed that there were a large number of patents, quotations from two of which had been read by Henry D. Hibbard, but his treatment emphasized that the ingot after the preliminary rolling must be returned to the soaking pit. In other words, the green steel must not be rolled to the finished product. For one thing rolling green steel is likely anyway, he said, to cause the development of fins, and these in turn produce various defects. Mr. Webster suggested that rolling such metal in the semi-fluid condition is likely to tear the ingot internally.

A. A. Stevenson, vice-president Standard Steel Works Company, Philadelphia, told briefly of experiments in the Watertown Arsenal with a green ingot, where cross cracks developed in the center of the bloom. E. F. Kenney, metallurgical engineer Cambria Steel Company, told of his experiences with 19 x 23-in. green ingots in which 4 oz. of aluminum had been applied to 3 tons of steel. The ingots had been charged 27 min. after pouring and were left 42 min. in the soaking pits. One was first rolled to 18 x 18 in. in size and then rolled to 9½ x 9½ in. and when cut was found to have a cavity and no soft center. A second ingot was also rolled, but the rolling was not stopped until the ingot was brought down to 12 x 12 in., when the entire center of the ingot ran out. Mr. Talbot suggested that the whole operation had been taken up too late.

Dr. P. H. Dudley, consulting engineer New York Central Lines, was also puzzled about the relatively soft center. He described his experience with the addition of ferrotitanium, charged as soon as possible, to avoid all cavity, and scarcely any pipe resulted. Some difficulty was had in handling the deoxidizing agents quickly enough.

Rails from Ingots Treated in the Talbot Method

Mr. Kirchhoff suggested that it might be interesting to learn to what extent the rail structure shown by Mr. Talbot appealed to the railroad engineers. Regarding the rail as performing somewhat the service of a beam, the soft center lies in the region taken by the neutral axis and points where the stresses on the metal are of relatively low intensity. W. C. Cushing, chief engineer, maintenance of way, Pennsylvania Lines, Southwest System, Pittsburgh, was not certain of the service a rail made by the Talbot method would give, and he was inclined to look at it with suspicion. The worst cases of rail failure show rails of the relatively soft center. He said further that the segregated material was usually higher than mentioned by Mr. Talbot, and what the effect with less of the metalloid would be he was not able to say. He emphasized that railroad engineers are looking for the production of the sound ingot and for a settlement on a definite percentage of the discard, so that these questions may be removed from the sphere of discussion. He would like to see the Talbot process run down to a con-

clusion, and he expressed the hope that the steel companies could find it advantageous to prosecute the method to the end.

Max H. Wickhorst, engineer of tests, Rail Committee, American Railway Engineering Association, Chicago, described his study of ingots made by the open hearth, but especially by the Bessemer process, without using a deoxidizer. He found a soft center below the middle of the ingot. The soft center took a pear shape in the longitudinal section of the ingot, with the apex of the pear about one-half way up.

Suggested Theory for the Ring of Segregation

Bradley Stoughton, metallurgist, New York City, referred to the growth of crystals noted in bled ingots, to which crystals Dr. Howe had given the name pine tree crystals, and suggested a line of thought in this connection as probably the one to follow to explain the segregation occurring against the hardened shell of the ingot when the ingot is put under compression, according to the Talbot process. He referred to Sir Robert Hadfield's experience with molten copper run into ingots a few minutes after teeming, as described in *The Iron Age* of October 3, and in this connection reference may well be made to the remarks by Dr. Stead in *The Iron Age* of October 17.

In a reply to Mr. Stevenson, Mr. Talbot brought out that the cropping that is done is merely enough to square the ends of the blooms. In respect to the references which have been made to the possible disadvantage of the ring of relatively high carbon metal existing between the exterior shell of the rail and the soft center running from the head through the web into the flanges or base, Mr. Stevenson thought that the experience might be similar to that had with Harveyized steel tires some years ago. It was found that there was a gradual separation between the hardened surface and the soft interior, and this separation took place along the line of demarcation between the two different metals, if they may be so called. Mr. Talbot in this connection called attention to the fact that the center is not really soft, running about 0.45 to 0.50 per cent. carbon, while the ring in one rail to which he referred was 0.77 per cent. carbon and 0.66 per cent. in the outside portions of the rail.

Talbot Method to Be Investigated

W. R. Walker, assistant to the president of the United States Steel Corporation, said that his company would be willing to manufacture and investigate rails along the lines of the Talbot process.

In reply to a question of Mr. Kirchhoff with regard to whether or not the drop test reveals any separation along the surfaces taken by the ring in the rail section, it was explained by Mr. Talbot that no such results were obtained by the drop test on which the English railroad engineers rely almost altogether. He showed a photograph and stated that the rails withstood the drop test satisfactorily.

A little amusement was injected into the meeting by Mr. Talbot's inquiring what negative segregation really meant. Dr. Howe said that segregation is really enrichment, and that when the steel contains a less amount of the materials serving to enrich the metal than is contained in the ladle steel, there is impoverishment and therefore negative segregation. Mr. Wickhorst suggested that it describes a steel below the average and was the result of needing a term to describe the conditions. Mr. Stevenson suggested, but not for publication, that negative segregation is segregation "gone wrong."

Mr. Talbot in his closure said that he was going to continue the work to satisfy himself absolutely with regard to the regularity of the production of ingots and rails with the characteristics described and then he was to put in a plant to treat the ingots in a commercial way.

How to Make Sulphur Prints

In reply to a question on how to make sulphur prints, which are important in showing the relatively high segregation in the region against the hard outside and surrounding the soft center, he explained briefly the process. What is known as vigorous glossy velox photographic paper is used. It is soaked in a 2 per cent. solution of sulphuric acid and it is then brought against the clean surface of the steel for one minute and then is washed, put in the hypo solution, then washed a second time and dried. The manganese sulphide reacts on the chemicals of the paper, developing black spots or areas.

The Photographs Displayed

The photographs which were displayed in the meeting room by the author showed longitudinal sections of ingots both with and without aluminum deoxidizer, and reduced in section by the blooming mill in the usual way, and also reduced in section after the early preliminary passage a few times through the blooming mill. These views are the same as those given in *The Iron Age* of October 17, but in addition they also included reproductions of the sulphur prints. The sulphur prints showed the small dark spots in a region more or less parallel with the outside surface of the ingot, the segregation region rounding at both ends, and making a flattened oval ring extending from the top to the bottom of the ingot, the black spots, of course, being obtained from the action of the manganese sulphide. Within this flattened oval ring lay the lighter area of softer steel and relatively purer steel. A few photographs were also given of sulphur prints of sections of rails of both the type common in this country and the bullhead rail used in England. Sections of the rail rolled from the top of the ingot and for successive distances down the length of the ingot to the bottom were shown, about six sections, all told. The last section came without the zone of the soft center. These photographs not being available at this writing, a table has been prepared covering the chemical constituents of these rail sections not only for the rail rolled from the top of the ingot, but for the rail rolled near the center of the ingot, and for rails rolled from next to the bottom section of the ingot and from the bottom section. This table indicates clearly the difference between the rail rolled outside the soft center of the ingot, or at the bottom of the ingot, and the others which have the soft center, as the analyses show.

Mr. Talbot also shows the results of a tensile test of the rail material, explaining, however, that while most of the English engineers rely on the drop test, there are some who require the pulling test. The interesting fact regarding the tensile test is that the specimens for tests were forged from bullhead rails to test bars 1 in. in diameter and slightly annealed before putting in the testing machine. This fact should be recalled in noting the tests given in the tables. These tests were made at the Cargo Fleet Iron Company at Middlesbrough, and the drop tests here tabulated were made on rails rolled from an ingot treated with aluminum.

The total attendance at the meeting was between 40 and 50, and besides those to whom reference has already been made, the following were among those in attendance: Knox Taylor, president Taylor Iron & Steel Company, High Bridge, N. J.; John D. Isaacs, consulting engineer, Harriman Lines, New York City; Theron I. Crane, Pilling & Crane, Philadelphia; A. W. Gibbs, chief mechanical engineer, Pennsylvania Railroad, Philadelphia; C. F. W. Rys, metallurgical engineer, Carnegie Steel Company, Pittsburgh; Dr. George W. Sargent, fourth vice-

Analysis of Rails Rolled from an Ingot Treated According to the Talbot Process.

	From top of ingot				About middle of ingot				Near bottom of ingot				From bottom of ingot			
	Outside.	Ring.	Center.	Web.	Outside.	Ring.	Center.	Web.	Outside.	Ring.	Center.	Web.	Outside.	Ring.	Center.	Web.
Combined carbon	0.62	0.69	0.59	0.57	0.65	0.69	0.50	0.47	0.65	0.70	0.42	0.40	0.63	0.56	0.54	0.54
Silicon	0.262	0.262	0.262	0.272	0.291	0.263	0.282	0.272	0.291	0.258	0.235	0.225	0.282	0.282	0.254	0.244
Sulphur	0.058	0.075	0.047	0.048	0.056	0.075	0.034	0.033	0.058	0.076	0.027	0.03	0.054	0.051	0.046	0.052
Phosphorus	0.03	0.037	0.022	0.025	0.033	0.038	0.02	0.019	0.028	0.036	0.018	0.023	0.031	0.028	0.029	0.027
Manganese	0.82	0.86	0.82	0.80	0.82	0.85	0.80	0.79	0.84	0.83	0.78	0.76	0.87	0.80	0.79	0.80

NOTE: The interior or center of the head, the middle of the web and the interior of the base form a continuous center of relatively low carbon with a minimum amount of the segregating materials; surrounding or enclosing this center is a ring of relatively high carbon, sulphur and phosphorus content, while the outside of the rail is of a composition lying between that of the ring and the center.

president, Crucible Steel Company of America, Pittsburgh; Dr. S. V. Hunnings, chemist and engineer of tests, American Locomotive Company, Schenectady, N. Y.; Dr. J. S. Unger, Research Laboratory, Carnegie Steel Company, Pittsburgh; Dr. Joseph Struthers, secretary of the American Institute of Mining Engineers; A. R. Ledoux, mining engineer and assayer, New York City, and J. R. Onderdonk, engineer of tests, Baltimore & Ohio Railroad.

Drop Tests of Rail Rolled from Ingot Treated in Accordance with the Talbot Process.

Deflections for Different Drops.

First, 7 ft	Second, 20 ft.	Third, 20 ft.	Fourth, 10 ft.
1.05	3.5	Broke	....
1.06	3.6	Broke	....
1.05	3.5	Broke	....
1.05	3.5	6	Broke
1.	3.4	Broke	....
1.	3.35	Broke	....

NOTE: Specimens 5 ft. long; bearings, 3½ ft. apart; tup, 1 ton; tests on 88½-lb. and 95-lb. bullhead rails.

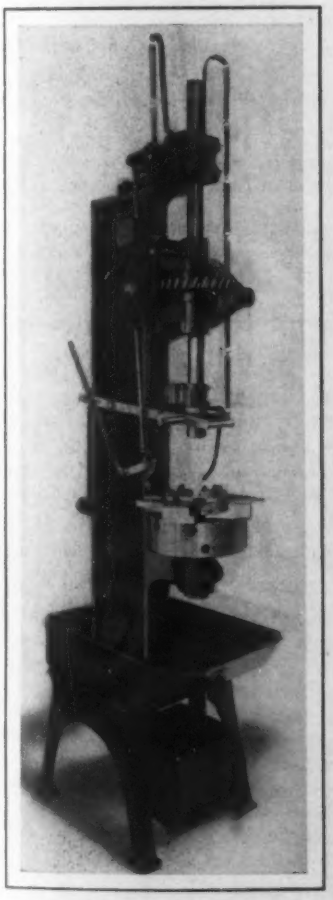
Pulling Tests of the Rails.

Tensile strength, lb. per sq. in.	Elongation per cent., in 2 in.	Reduction of area, per cent.
120,960	21.5	26.5
108,864	23.5	37.7
119,168	20.5	29.8
117,600	23.5	30.6
117,824	21.5	30.3
116,032	22.	33.8

NOTE: Specimens for tensile tests forged to 1 in. in diameter and slightly annealed.

A New Type of Upright Threading Machine

Simplicity of design is the particular feature characterizing the new upright threading machine that has been recently developed by the Bickford Machine Company, Greenfield, Mass. A special type of solid adjustable die head is used with the machine and by making the lower spindle bearing readily removable to give an increased travel, the machine can be used for threading staybolt and other taps having long threads.



A New Type of Upright Threading Machine with a Special Style of Die Head Built by the Bickford Machine Company, Greenfield, Mass.

As will be noticed from the accompanying engraving, the machine consists essentially of a vertical column resting upon short legs which also carry a pan for the oil and chips. A foot, supporting the die head, projects from the base of the column and above this are the bearings carrying the vertical spindle which has a diameter of 2 in. This spindle is driven by a worm and worm gear having a ratio of about 10 to 1, the worm being located on a horizontal shaft near the top of the machine, which also carries a cone pulley for a 3-in. belt. The upper end of the spindle carries the threaded shells or lead screws, which are forced down by half nuts operating in a slide that is made a part of the main column. All of these lead screws and nuts can be easily changed for the different pitches and if desired can be supplied with an increased lead to compensate for shrinkage in the hardening of the taps. The lower end of the spindle carries a holder to drive the tap which drops through the base of the machine. It also carries a horizontal bar to which pull springs from above are attached, but does not revolve this bar. The function of these springs is to return the spindle to its normal position when the nuts are released from the lead screw by a trip which can be set to act just after the tap drops from the holder.

In operation the square shank of the tap is inserted in the driving dog in the lower end of the spindle, while the machine is running, and is held in position with one hand, while the other grasps the short cross handle in front and pulls the spindle down until the tap enters the die. As soon as the tap enters the die it is left free and the same hand which has pulled the cross handle pulls over a lever having a chain attached to its short arm, this operation locking the half nuts over the lead screw.

The capacity of the machine is from ½ to 2 in. and the same set of chasers can be used on any size tap taking the same pitch of thread. The floor space occupied measures 21 x 30 in., the latter dimension being the depth from front to rear and the over-all hight is 100 in. The approximate weight of the machine is 1300 lb. The equipment of the machine includes a pump at the rear which is driven from the countershaft and supplies an ample stream of oil to the work.

The solid adjustable die head used in connection with this machine is one which the builder has had frequent calls for. The basis of this die is a four-jaw combination geared scroll chuck having a diameter of 10½ in. Special jaws or chaser holders are made which carry milled chasers of the same style as that used in the company's smaller open die. These chasers are dovetailed and clamped down and are backed up by screws having a longitudinal adjustment. The holders can be adjusted separately or operated together and when in position they are securely clamped to the body of the chuck.

Automatic Discharge Sack and Package Elevator

For handling barrels, sacks and boxes in quantities, in buildings with several floors, the Link-Belt Company, Chicago, Ill., has brought out an automatic discharge elevator. The construction of the elevator is such that it is possible to handle packages going up and coming down and to discharge them in both directions. Among the classes of buildings where elevators of this kind are used are cold storage warehouses, freight houses, bakeries, canning and fertilizer factories, etc. Two of the especial features claimed are simplicity of construction and low power consumption.

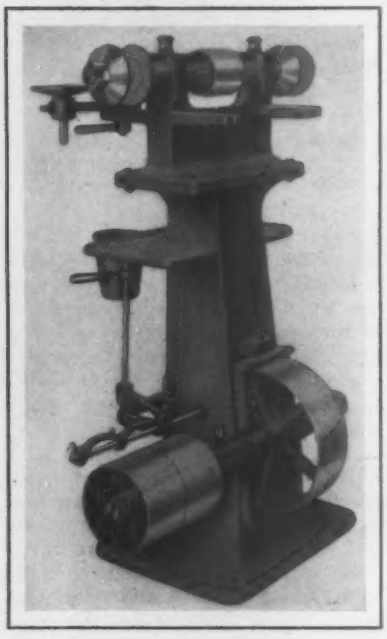
An Automatic Discharge Elevator for Handling Panels, Sacks, Boxes, Etc., Built by the Link-Belt Company, Chicago, Ill.

The elevator consists of a single strand of strong chain to which carrier arms are attached, a portion of the carrier being hinged so as to tilt forward and discharge a package where it is wanted. The discharging of the packages is regulated by cams on the elevator frame, located one at each floor. These can be thrown into or out of engagement so as to make the carriers discharge at any floor, while as an added convenience they can be controlled by a hand line from the loading point or any other floor.

The William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., launched successfully on November 6 the Santa Cruz, one of four vessels, each 435 ft. long, 53 ft. beam and 26 ft. deep, with a registry of 10,000 tons, building for William R. Grace & Co., New York, which will be used in the Pacific coast trade.

Grinding Machine with Self-Contained Countershaft

A self-contained countershaft which is carried by a frame attached to the column by accurately milled gibs is the special feature distinguishing the new type of grinding machine that has been recently brought out by the St. Louis Machine Tool Company, St. Louis, Mo. As compared with the detached type of countershaft, the advantages of smooth running of the grinding wheels, accurate alignment, ease in varying the belt tension and the locating of the belt where it is out of the way are claimed.



A Novel Type of Grinding Machine Having a Self-Contained Countershaft Built by the St. Louis Machine Tool Company, St. Louis, Mo.

The spindle is made of 0.40 per cent. carbon steel and is driven from below. This arrangement it is emphasized insures a smooth running of the wheels as the pull of the belt is downward against the body of the machine. The bearings are dust-proof, are lined with anti-friction metal and have oil cellars. The bearings are self-oiling and the bodies and caps are milled to relieve strain on the screws. The brackets for the rests are shorter than the straight type and back rests are furnished for receiving the wheel guard or other fixtures. The belt tightening device is simple and it is claimed will keep the belt at the proper tension until entirely worn out without cutting. It is operated by a screw which controls the movement of the countershaft frame.

The wheel guard which consists of a steel channel rolled to a segment of a circle is very stiff and is reinforced by a heavy cast-iron bracket riveted to the inside flange of the channel. This bracket is attached to the back rest by a bolt which slides in a slot, thus allowing the guard to be adjusted backward as the wheel wears. The lips of the guard can be kept close to the wheel where they are not in the operator's way. It is pointed out that this guard effectively prevents fragments from striking the operator in the face as if the wheel should break, the pieces would strike inside the flanges of the channel and be prevented from flying.

Six sizes of machine are built and the following table gives the principal dimensions and specifications:

Machine No.	1	2	3	4	5	6
Diameter of wheel, in.	6	8	10	12	14	16
Face width of wheel, in.	1½	1½	2	2	2½	3
Diameter of arbor in collar, in.	⅝	¾	⅞	1	1⅛	1¼
Diameter of arbor in bearings, in.	¾	⅞	1 1/16	1 3/16	1 5/16	1½
Length of arbor, in.	16	18	22	27	30	34
Distance between wheels, in.	10¾	12	14½	18	21	23½
Length of bearings, in.	3	3½	4½	4¾	5¼	6
Hight to center of arbor, in.	4½	5½	6½	7½	8½	9
Size of base of head, in.	3¾x 7	4½x 9	6 x10½	6½x14	8 x16½	10 x19½
Floor space required, in.	10 x14	11 x15½	12 x16	16½x17½	18 x20	18 x25
Complete weight, lb.	140	170	208	250	320	520

All of the machines are furnished with a plain driving pulley and if desired the three larger ones can be supplied with a cone driving pulley.

The American Iron & Steel Mfg. Company announces the removal of its office at Atlanta, Ga., to rooms 1112 and 1113 Candler Building. Charles P. King is Southern sales agent.

Minnesota Iron Ore Tonnage

The Tax Commission's Assessment Covers a Total of 1,401,340,743 Tons

The Minnesota Tax Commission has completed the equalization of the iron mineral properties in St. Louis, Itasca and Lake counties. After deducting the 1911 shipments of 23,221,070 tons and the stockpiles of May 1, 1912, which were 8,170,537 tons (assessed as personal property), and making adjustments for the new tonnages developed during 1911 and for revised calculations on old tonnages, the net result is 1,401,340,743 tons. This amount of developed, measured, merchantable ore remaining in the ground is distributed as follows:

	Tons
St. Louis County	1,233,014,609
Itasca County	167,822,791
Lake County	503,343
Total tonnage	1,401,340,743

It is divided between the two iron ranges as follows:

Vermilion Range	10,957,708
Mesaba Range	1,390,383,035
Total tonnage	1,401,340,743

The total equalized assessment against this tonnage remaining in the ground is $254,553,179. The total tonnage for 1911 was 1,367,474,853. The total assessment in 1911 was $232,368,469. The tonnage for 1912 thus represents an increase of 33,865,890 tons and the assessment for 1912 an increase of $22,184,710. The increase is due partly to the increased tonnages shown above, but more largely to increases in the assessed valuation of all mineral property made by the Tax Commission. The assessment of mineral properties on the Cuyuna range shows a large increase over the previous assessment. The iron ore bodies of that range will soon be so far developed that the tonnage may be accurately measured and the grade determined. Below is given a summary of the Tax Commission's mineral assessment of iron ore contained in St. Louis, Itasca and Lake counties:

Year	Remaining tonnages May 1	Assessed value	Shipments, tons
1907	1,192,509,757	$186,720,026	29,180,975
1908	1,193,728,959	174,273,632	18,098,894
1909	1,310,190,194	199,008,838	29,284,496
1910	1,347,596,291	220,423,038	30,317,583
1911	1,367,474,853	232,368,469	23,221,070
1912	1,401,340,743	254,553,179	.....

The assessment of personal property, including stockpiles, prospects and mineral lands is not included. The mineral lands containing the above tonnages were assessed in 1906, the year prior to the organization of the tax commission, at $64,486,409. After the adjustments for shipments, stock piles and new tonnages were made for 1912, as referred to above, the Tax Commission made a general increase of 5 per cent. in all tonnage values.

The C. O. Bartlett & Snow Company, Cleveland, Ohio, reports a heavy demand for dryers, coal crushing and ash handling machinery, garbage reduction plant equipment and its other products. Among orders recently taken are dryers for use in a variety of plants all over this country and in Canada, sand and gravel plants for the Summit Silica Company and the Hastings Washed Gravel Company, Newburgh, Ohio; garbage disposal plants for companies in Boston and Springfield, Mass.; brick making plants for the Firebrick Company, Cleveland; George F. Clifford and William Clifford, Detroit, and three fuel lighters for the Dominion Coal Company, Montreal.

Smoke Investigations In and Out of Furnace*

Faulty Furnace Construction—Improper and Proper Charging Methods—How Smoke Can Be Analyzed and Recorded

BY ALBERT A. CARY

The need of more definite information has caused me to use improved methods for smoke investigation, and this work is leading to considerable valuable information as applied to furnace investigations aside from its study from the standpoint of atmospheric pollution. I do not wish to convey the idea, from this statement, that there is any appreciable amount of heat to be derived from the non-gaseous matter contained in the smoke, as, in the very worst cases, this solid matter never amounts to 3 per cent. of the weight of the coal fired, and usually a considerable percentage of this rejected matter is non-combustible. The value of an investigation into the composition of this non-gaseous matter is found in the fact that it leads to the location of the bad conditions, producing this troublesome smoke, whether in the fire bed or in the combustion chamber of the furnace.

Misleading Stack and Furnace Conditions

Smoky chimneys are not always an indication of poor furnace construction, as improper furnace manipulation is frequently responsible for the wasteful conditions which lead to the smoke nuisance.

On the other hand, clear stacks are not always true indications of good and proper furnace conditions, as they are frequently obtained by wasteful methods without reducing materially the quantity of harmful impurities delivered to the atmosphere. For example, this condition is found with the use of steam jets in the furnace or combustion chamber beyond, some of which jet arrangements aspirate and deliver considerable quantities of air with the steam, and I have also seen provisions made to deliver a large amount of excess air between the furnace and chimney, to reduce the density of the smoke. If we add to each cu. ft. of dense smoke another cu. ft. of pure steam or air, the smoke appears not over half as dense as before, but, in reality, we are delivering just as much objectionable matter to the atmosphere as we were before.

I do not wish to be understood as offering a sweeping condemnation against the use of steam jets or secondary air admission, as I have found cases where their rational application has improved the average results obtained in steam plants. It must be kept in mind, however, that every lb. of excess air or steam introduced into the furnace chamber must be raised from its entering temperature up to the temperature of the gases escaping from the boiler (which means just so much less heat to evaporate the water), and unless a greater gain is obtained in the furnace than is lost by this large waste of heat at the flue outlet, we are paying dearly for our apparent smoke suppression, which, in reality, does not reduce the amount of objectionable matter rejected by the chimney.

Conditions Within the Fire Bed

A study of the conditions which exist within and beyond the fire bed is very instructive in connection with the study of smoke formation.

The coke, which remains after the gaseous matter has been distilled off from bituminous coal, we may consider here as being fixed carbon, which, as we have already seen, burns directly upon the grate into carbon dioxide and carbon monoxide when in the presence of ample heat and air. These gases, rising and passing through a newly charged layer of bituminous coal, have a tendency to retard its combustion by diluting the excess air which accompanies them. We also have an excess of nitrogen, due to the combustion of the coke below which has robbed some of the air of its oxygen. This circumstance still further slackens our combustion process.

With the hot bed of coke, beneath the superimposed layer of freshly charged bituminous coal, distillation begins near its under surface resulting in the passing off of tar vapors, rich in paraffin hydrocarbons and yielding very little gas, but the characteristic yellowish smoke is seen escaping from the upper surface of the newly charged coal.

As the upper layers of coal get hotter, many complex changes take place. As the process of distillation progresses and finally as heating progresses the newly evolved gases, along with the tar vapor, begin to burn on the surface where they mix with the more or less diluted air. Unless the conditions between the fire surface and the point where the gases enter the boiler are found favorable for their complete combustion, these hydrocarbon gases and the tar vapor will escape to the chimney more or less unconsumed. Favorable conditions mean a temperature above 1400 deg. F., and a sufficient supply of air, which, if introduced above or beyond the fire bed, must not chill the gas and vapor below their critical temperatures of combustion.

Reasons for the Formation of Soot

As the gases leave the fuel bed ignited, the flame appearing over each position of escape from the coal is a veritable small chemical laboratory, in the interior of which a very complicated series of actions and reactions is taking place. The flame is always hollow, and it is only at the exterior of the flame, or where it comes in contact with the oxygen of the air, that the combustion is more or less perfectly completed. The interior of the flame, although not undergoing combustion, is subjected to the baking influence of the exterior envelope and there the hydrocarbon gases and vapors are gradually broken down, the most important action being their conversion into the simple hydrocarbon, acetylene, C_2H_2, containing 24 parts by weight of carbon, and 2 parts by weight of hydrogen. These parts, if consumed, will result in the formation of carbon monoxide or carbon dioxide, and water in the form of superheated steam.

If sufficient air at the required high temperature is available for this combustion, no smoke will result, but with the air at the top of the fire bed more or less impoverished, owing to the presence of nitrogen and other products from the gas beneath and often due to the cooling effect of poorly introduced secondary air, the top of the acetylene flame appears a dull red in color and is extinguished before the carbon particles which give color to the flame can be consumed. Thus soot appears, which, if not re-ignited and burned before leaving the chimney, produces a sooty smoke at the chimney outlet.

We thus see that the soot, which is practically pure carbon, is produced above the bed of the fire, while the tarry matter is formed down in the bed of the fire where there is found but little air, and where the temperature is too low to produce good combustion. The soot thus formed is in very small and light particles while the tar vapor appears in the form of tiny vesicles, the skins of which are formed by the condensed vapor and liquids from the burning substances. As both the small particles of soot and these minute vesicles containing tarry matter are so light, they are easily carried in the mass of moving gases up the chimney and into the air.

Objectionable Constituents of Smoke

Although the soot is very soiling as it settles on our clothes, furniture, etc., it can be washed off with comparative ease. The tarry matter, on the contrary, is very greasy and penetrating, almost like a dye, and this is the most serious part of our smoke laden atmospheres. Another nuisance delivered from our furnaces is the small dry cinders which are picked up from the fire beds by the rushing currents of air and gases and carried out of the chimney. This specific trouble is common to both bituminous and anthracite fires alike.

To sum up these remarks, we see that what is commonly called smoke is composed of: (1) Carbon particles, escaping unconsumed from the burning hydrocarbons and

*Conclusion of series of five articles beginning in the issue of October 10 on refinements in testing boilers and furnaces.

producing soot. (2) Tar vapors, escaping from the cool coal when it is first charged into the furnace. (3) Steam, resulting from the burning of the hydrogen, and also coming from the moisture of the air and coal. (4) Small particles of dust which are carried by the draft which the chimney produces.

Quantity and Quality of Rejected Solid Matter

Returning to a previous statement, that the amount of non-gaseous matter which is rejected from our furnaces is a very small percentage of the amount of fuel from which it originated, I might refer to a test made when using a Western bituminous slack coal which gave an almost constantly smoking chimney, the smoke averaging, according to the Ringelman Chart, about 65 per cent.

From the 12,860 lb. of coal charged into the furnace I found that 180 lb. of solid matter was rejected from the flue outlet in ten hours, which is 1.4 per cent. of the coal used. In a sample of this solid matter there was found 6.2 per cent. of non-combustible matter and 93.8 per cent. of combustible which disappeared upon ignition.

In three other investigations made to determine the quality of this solid matter rejected with the furnace gases the following results were obtained:

	A	B	C
Carbon	86.80 per cent	66.25 per cent	77.26 per cent.
Hydrocarbons (including tarry matter)	4.35 per cent	4.82 per cent	3.69 per cent
Sulphur	0.00 per cent	3.73 per cent	1.70 per cent
Ash, etc.	8.85 per cent	25.20 per cent	17.35 per cent

Smoke Caused by Charging, How to Decrease It

We can now understand that smoke is due, in most cases, to improper cooling actions, either within or beyond the fire bed. When a fireman charges a thick layer of bituminous coal over his fire bed, the heat from the hot

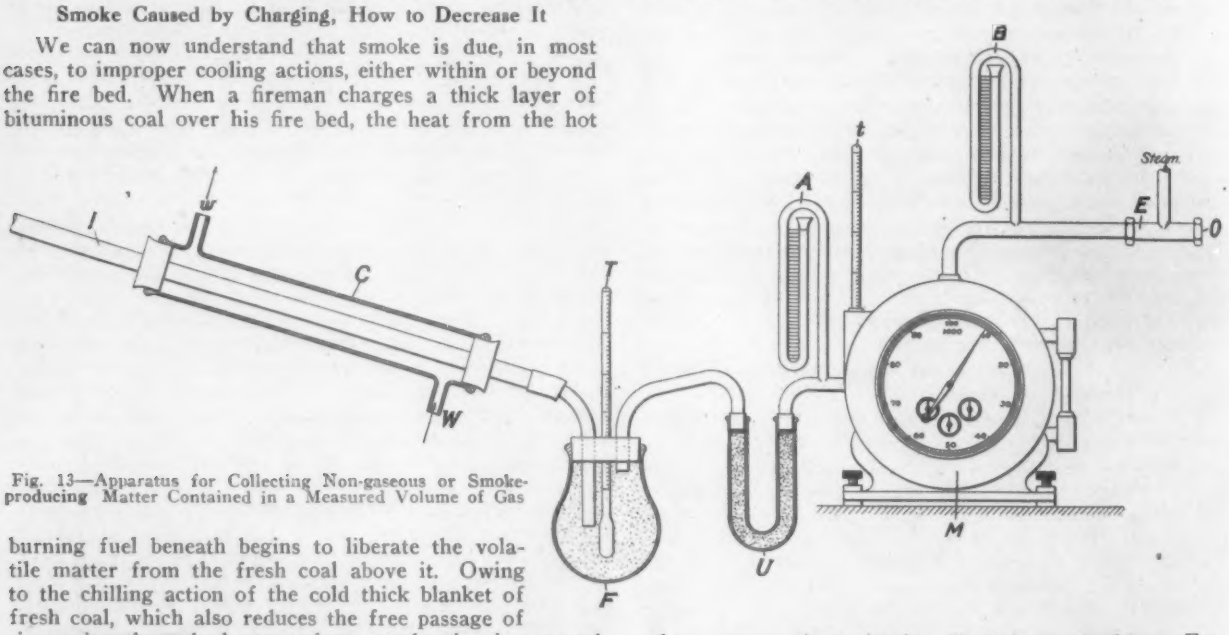


Fig. 13—Apparatus for Collecting Non-gaseous or Smoke-producing Matter Contained in a Measured Volume of Gas

burning fuel beneath begins to liberate the volatile matter from the fresh coal above it. Owing to the chilling action of the cold thick blanket of fresh coal, which also reduces the free passage of air coming through the grate bars, combustion is arrested and we see a dense smoke escaping from the top surface of the coal. This smoky matter cannot ignite there as it is separated from the hot fire by the blanket of cool coal, and it will be found that it is composed almost entirely of tarry matter.

This points quite conclusively to the necessity for sprinkling small quantities of coal over the firebed at frequent intervals rather than charging large amounts at long intervals, if the sprinkling method of firing is to be continued. Some prefer the alternate method of firing by first covering one side of their furnace, and after the gas has been distilled off from this coal they charge the other half of the furnace. Somewhat heavier charges of coal can be used with this method than in the sprinkling method, but this alternate firing method requires special combustion chamber arrangements to obtain the best results.

The coking method of firing is probably the best when taking average conditions. The coal is first piled across the front side of the furnace, where the principal liberation of gases and vapors takes place. Then these gases are made to flow over the hot fire bed, in the rear, which bed is formed by pushing back the front coal pile as soon as it becomes coked.

Faulty Combustion Chambers Another Cause

Another source of smoke production is traced to small or badly designed combustion chambers, in which chambers the gases should have a fair chance to mix with the excess air which should be found there. When such proper design does not exist in furnace construction the gases are rapidly chilled by coming in contact with the boiler parts which are very chilly compared to the temperature that must be maintained to continue the process of combustion.

Here again we find the chilling action producing smoke, and in short it may safely be said that smoke is almost invariably produced by cooling actions, which, if rationally stopped, will give us the clear stacks which indicate economical furnace conditions as well as a due regard for the rights of our neighbors, who object to our soiling their persons and properties.

Determination of Amount of Atmospheric Pollution

Turning now from the standpoint of furnace investigation to that of atmospheric pollution we can find, by determining the quantity of non-gaseous matter rejected from the furnace, the exact amount of nuisance we are maintaining. For the collection of samples of non-gaseous matter contained in smoke a more complicated apparatus is required than is needed for collecting samples for gas analysis.

On account of the small percentage of impurities carried in the gases escaping from the furnace, a large amount of gas must be carried through our sampling collector in order to obtain a sufficient amount of these impurities to make a proper determination of their composition. For this reason the measuring burette has to be dispensed with and a small experimental gas meter must be used in its place.

One of the forms of apparatus I have used for this purpose is illustrated in Fig. 13 and for the original idea, from which I constructed this appliance, I wish to thank Prof. N. W. Lord. The inside sampling pipe is placed in a carefully selected position just inside of the flue outlet from the furnace. This sampling tube is connected by piping to the inlet of the apparatus at I, while at the outlet O, beyond the small experimental gas meter, is placed the steam ejector E, which draws through the appliance a constant flowing stream of furnace gases laden with their tar vapor, soot, steam and cinders.

The gases with their impurities first enter a glass condenser C, which has its cooling water entering at W and leaving at w. Here the water vapor carried in the gases is condensed and allowed to flow downward into the flask F, which is made of very thin glass. The flask is filled with ignited asbestos, which acts as a filter, and removes the tarry matter, soot and mineral matter. The remaining gases then pass through the U tube U, which is loosely packed with cotton, and from this position the gases pass on to the experimental meter M, which indicates the passage of 100 cu. ft. of gas with one revolution of its large pointer. This meter can be read to 1/1000 of a cu. ft.

The water contained in the measured sample is deter-

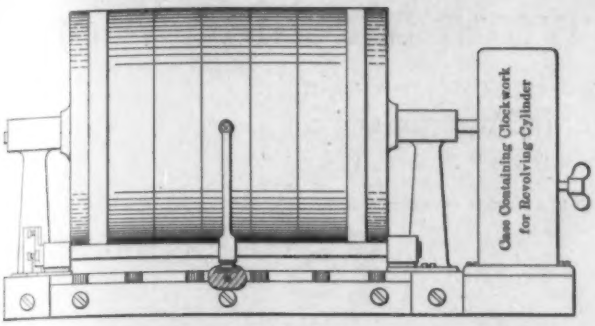


Fig. 14—The Smoke Recorder, Showing the Stylus, Which is Moved by Hand

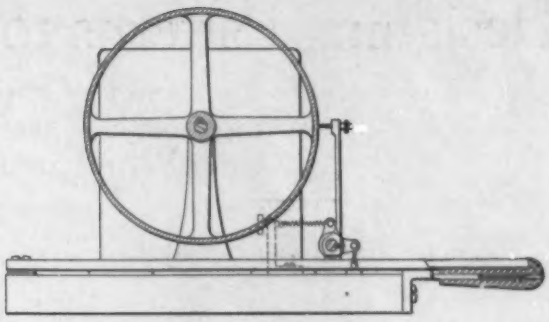


Fig. 15—An End View Which Shows the Stylus and Lever-Handle Connections

mined by weighing the flask before and after starting the test and then drying the contents to constant weight over sulphuric acid, when the loss in weight will show the amount of water contained. If we merely wish to determine the *combined* amount of soot and tar contained in the sample this can be obtained by simple ignition, which will leave behind the mineral matter. To determine the separate amounts of soot and tar the residue in our filter is carefully collected and analyzed. The loose cotton in the U tube should show no discoloration when the preceding part of the apparatus is working properly. But should discoloration take place any tarry matter may be extracted by the use of carbon disulphide.

After having determined the amount and quality of the non-gaseous matter contained in our sample as above we take the readings obtained from the meter, the U tubes A and B, showing the entering and leaving pressures of the gas passing through the meter, and the temperatures on the finely graduated thermometers T and t. We also take the observations made at the flue outlet from the furnace, which give us the pressure and temperature of the escaping gases. We then compare the volume of gas leaving the furnace (which is obtained through use of the gas analyses and fuel data) with the volume of gas passing through our meter (both reduced to standard pressure and temperature), from which we estimate the total quantity of non-gaseous matter delivered from the furnace.

From the pressure and temperature of the gas passing out of the apparatus, which gas is saturated with water vapor, we estimate the quantity of moisture lost in this way. This is added to our previously obtained water content to obtain the total moisture.

After determining the amount of non-gaseous matter carried in our escaping furnace gases and producing troublesome smoke, we remember that this sample represents the total amount produced and delivered from the furnace during the entire period of the test, which may be of eight or ten hours' duration. Although this gives us the true measure of the smoke nuisance being maintained, we know that by averaging our final result over small intervals of time we will not be able to obtain a true estimate of these peroids, as the production of smoke is almost always an intermittent operation rather than a constant unvarying condition. If we wish to obtain a fair idea of how and at what times the varying emissions of smoke take place we will find the use of the Ringleman or other smoke charts a great help.

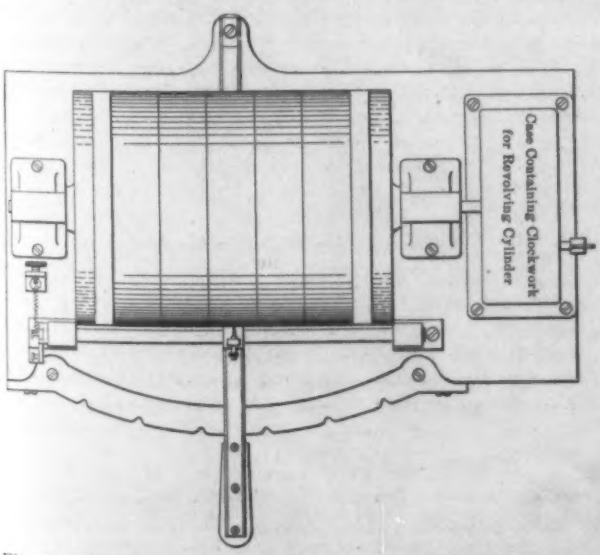


Fig. 16—The Notched Segment to Adjust for Different Percentages of Issuing Smoke

Description and Operation of a Smoke Recorder

Some years ago I invented a semi-automatic smoke recorder, which was a considerable improvement upon a similar device used during the Paris Smoke Tests (conducted in France between 1894 and 1897) and two of these machines were built, giving excellent satisfaction. This machine is illustrated in Figs. 14, 15 and 16.

It consists of a cylinder secured upon a shaft, which shaft is turned by a clockwork so as to revolve the face of the cylinder exactly 1/10 in. per min. A piece of ruled section paper with 1/10 in. spacing similar to the paper placed upon the drum of a steam engine indicator is tightly secured to the face of the drum. The stylus, which marks the record upon the paper, is moved along its carrying bar by the movement of a handle carried out beyond the base of the machine on the end of a lever. Under the bottom of the handle there is arranged a spring latch or bolt, which engages lightly in any one of the 6 notches cut in the metallic segment, which is placed beneath the outer end of the pivoted lever.

When in use the observer places his smoke chart between himself and the chimney in order to judge the comparative density of the issuing smoke. With no smoke visible he moves the lever of this machine (placed in a convenient position before him) so that the detent or spring latch engages in the first notch to the left. As this latch easily slips out of the notch, he has merely to move the lever to disengage it.

When 20 per cent. of smoke appears he moves the lever toward the right until the latch engages in the second notch. The third notch is for 40 per cent. of smoke, the fourth for 60 per cent., the fifth notch for 80 per cent. and the sixth notch is for 100 per cent. of smoke density. Any intermediate reading between these percentages is obtained by moving the latch to a corresponding intermediate position between the notches.

As the lever is moved it carries the stylus along the paper, marking the observed degree of smoke density. When the observation is finished the paper is removed from the cylinder and you have a completely plotted result of the exact variation of smoke density showing exactly the time when this density is at its maximum and when at its minimum with all intermediate degrees of density plotted between.

Such a chart, obtained with the least manual effort, forms a valuable record of smoke observations, especially if taken in connection with a timed record of furnace operations, such as coaling, cleaning or slicing fires. It is even more valuable when it can also be compared with a series of frequent furnace gas analyses.

There has recently appeared upon the market a very ingenious automatic smoke recorder, which impresses upon a clock moved strip of paper the degree of density of the smoke occurring at every moment. It uses a suction apparatus, on the order of the ejector I have just described, which continually withdraws a sample of the smoke-laden gases from the flue. These gases are conducted through piping to the moving strip of paper, where they are projected upon the paper's surface. This causes a line of discoloration from almost white through the browns to a black color. The time of the deposit of these various shades is indicated by marking printed along the edge of the moving paper.

Designing Patterns to Save in Machine Work*

Things to Be Considered in Pattern-Making to Minimize Investment in Patterns and an Unwise Amount of Machine Shop Work

BY STUART DEAN

The design of a plant's product often determines whether or not the plant will make money. A design which involves complicated core work in the foundry, difficult and close machine work, or which is inconvenient to assemble will eat up all the profits by a high labor cost. The proportion that the labor cost bears to the material cost on a machine must be known in order to design intelligently. This makes it possible to judge whether or not an increase in material that decreases labor will pay.

When Not to Save Metal in the Product

For instance, thicken a casting if this saves enough time and lost castings in the foundry to more than pay for the extra metal. On the other hand if the value of the material saved will be more than the expense of the extra labor incurred, it may pay to so design that hand work is done which would have been avoided had more metal been allowed. This would be true of brass work where material cost is a big item. In considering costs in this light, the overhead expense must not be added, as that is merely a charge that the customer must pay to take care of the running expenses of the plant.

Wherever possible machinery should be designed on the unit plan. Divide portions of the machine into units. Use one unit on as many different sizes of machines as possible. These units can be manufactured in lots, and producing methods which will result in economy can be worked out in great detail.

The designer must consider not only the strength of the machine he is building. He must keep his eye on the pattern shop, the foundry and the machine shop all the time. He must so design that the work done in each will decrease to the greatest possible extent the labor cost in the next following department. The patterns should be made to save the molder's time. Likewise, the castings should be such that no more machining need be done than is absolutely necessary.

Pattern Drafts

Allow 4 deg. draft on the outside of all patterns. Show this on the drawings. Do not depend on the pattern shop to get it. Allow 10 deg. draft on the sides of a cast hole made by green sand. See that these holes are brass bushed or brass lined in the pattern. The sand will draw smoothly and the cast hole will need no drilling or filing to clean out bumps or fins. Unless these rules are followed it will cost more to cast holes than to drill them.

The words "Give abnormal draft to all patterns" should be painted on large signs all over the walls of the drafting room and the pattern shop. They should be drilled into every one who does any pattern or drawing work. If the patterns are designed and built with big draft, there will be a saving made in the foundry that will pay the draftsmen's salaries many times over. Besides reducing the cost of molding, good draft will insure the casting's being absolutely true to the pattern, because all the handwork, patching of the mold, etc., will be eliminated. This will permit a great reduction in the amount of finish to be allowed on castings, which often means a reduction of one-third in the machining time. A foundryman once said: "I want so much draft on a pattern that I have to lay pigs of iron on it to keep it from jumping out of the sand of its own accord."

Designing with an Eye to the Cores

Design so that most of a pattern is in the drag and the less amount in the cope. The cope part of a casting costs 3 cents per pound; the drag part only 2 cents. Get as much of the casting at 2-cent rate, and as little at the 3-cent rate as is practicable. Never design a piece with underarm (parts of pattern that have to be drawn out of the mold horizontally). Such a casting will cost 4 or 5 cents per pound. The green sand core that the pattern leaves must be in the drag part of mold.

Never design so that cores will have to be hung on the sides of a mold. It takes as long to secure these cores as it does to make an entire mold. Design such cores as port cores, of as nearly a square section as possible. Avoid the extreme flattened section. The square section cores are less trouble in the foundry because they are easily rodded and vented, and they can be handled with less danger of breaking.

In many places a cast bolt slot will replace a cast bolt hole. If slots are used, the parting of mold should come at the end of the slot, not half way down in the slot, else a shift of the mold would narrow the slot and give the assembler handwork.

Cored holes that afterward have to be drilled, unless they are quite large or deep, are bad. With the modern high speed steel drills, the relief of the hole by coring is of little help. The sand that is burned into the casting may necessitate regrinding the drill every five holes. The grinding time on the drills will more than equal the time saved by the cored clearance holes, and omitting the coring will reduce the molding cost.

A Single Pattern for a Number of Shapes

Where a single pattern is used to make a number of different shapes of castings, have that part of the pattern that receives the change made separate from the body of the pattern. It should be doweled on and also held with screws. A pattern of this character would be for work that does not come up often enough to pay for a separate pattern for each class of casting. The core boxes may be separated in the same way at the same point. With this arrangement only a few minutes' work is needed in order to change from one pattern to another.

The usual way of making such changes is to hunt through a mass of pieces that were used before, and nail them to the pattern, thus gradually ruining it. The mass is sent down to the foundry with a bunch of stop-off pieces, to set the molder and the foundry foreman worrying over the hieroglyphics of chalk marks and stop-offs. The result is a bumpy casting, costing 4 or 5 cents per pound, instead of a fine smooth casting, costing 2 or 2¼ cents per pound. The chances are that you will lose the casting from dirt, drop out or wash.

Allowances for Finish in Machining

The designer can save the machine shop lots of work by dimensioning the patterns so that there is no great excess of metal to be machined off. The following allowances for finish are about right:

Cylindrical work where the surface is crossed by the molding parting.—A round bar, cast horizontally in a mold, is a good illustration. In this style of a casting there is a chance for mold shift.

3/32-in. finish on a side of 1½ in. diameter.
3/32 in. each side of pieces up to 3 in. diameter.
⅛-in. finish on a side of 6 in. diameter.
⅛-in. finish on each side of pieces up to 8 in. diameter.

If the piece is long, and, for this reason, likely to be out of true in the rough, double the above allowances for finish.

Surface not crossed by a parting, such as a piece cast on end.—A shift on this casting is impossible.

3/64-in. finish on each side of piece 1½ in. diameter.
3/64-in. finish on each side of piece 3 in. diameter.
1/16-in. finish on each side of piece 6 in. diameter.
⅛-in. finish on each side of piece 12 in. diameter.
3/16-in. finish on each side of piece 40 in. diameter.

On small and medium-sized cylindrical castings that are cast on end the pattern has to be given draft. It is best to leave no finish at the small end of the taper, and to depend on the taper of the draft of the pattern to give the finish.

1/32-in. depth of cut is a heavy cut when turning a piece 1½ in. diameter.
1/16-in. depth of cut is as heavy as an 18-in. lathe will pull economically.
3/32-in. depth is a good cut in turning 10 in. diameter on a 20-in. lathe.
⅛-in. depth with 1/9-in. feed is a heavy cut on an 8-in. diameter cast-iron bar.

For Boring Cylinders.

Allow 1/16-in. finish on each side of a 2-in. to 8-in. bore.
3/32-in. finish on each side of an 8-in. to 11-in. bore.
¼-in. finish on each side of an 11-in. or larger bore.

Allow for one roughing cut and one finishing cut on all cylinders up to 11 in. diameter. Allow for two roughing cuts and one finishing cut on cylinders 11 in. in diameter and larger.

In the foundry have the cylinder core made in a full cast iron core box which has been bored out perfectly true and to size. Have the cores dried in half dryers, made exactly the same as the core box. Have the cores a tight fit in the core prints of the molds.

Finish on ends of pattern where mold parting crosses, such as the ends of a steam cylinder. Have the surface beveled from the edge of the flange to the bore of the cylinder. Allow no finish at the outside edge, and depend on the heavy bevel of the draft to give the finish.

Offset shoulder.—A small offset cast on a piece that corresponds to an offset that is to be machined on the piece should be made a bevel on the pattern and not a square edge. See Fig. 1. Leave no finish at the very corner of the offset. This bevel will prevent the sand burning into the corner, and will save the cutting tool, thus speeding up the work.

Design Details to Save Machining Work

The designer will save the machine shop much work and save much money for his firm, if he will observe a few details which make it easier for the machine shop to accomplish its end of the job.

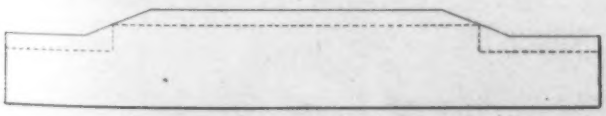


Fig. 1—Casting for an Offset Shoulder

Use through holes wherever possible. These are more quickly drilled, as no attention has to be paid to depth. Where the hole is tapped, one tap can be run through instead of using two or three as with a closed bottom hole. A through hole is easier to stud or to put a cap screw into as no attention need be paid to cleaning out the chips in the bottom of the hole. Where tapped holes bottom, design them twice as deep as the diameter of the tap in order to take care of the chips and the taper end on the first tap. A ¾-in. tap is ground back 5/16 in. The stud is run into the hole ⅞ in. There should be an extra allowance at the bottom for chips of 5/16 in. making a total depth of 1½ in. or twice the ¾ in. diameter.

The following table of cast clearance holes will be found useful.

Diameter of Cast Clearance Holes for Studs.

⅜-in. stud, 15/32-in. hole at smallest point.
½-in. stud, 19/32-in. hole at smallest point.
⅝-in. stud, ¾-in. hole at smallest point.
¾-in. stud, 1 -in. hole at smallest point.

Diameter of Cast Clearance Holes for Cap Screws.

⅜-in. cap screw, 15/32-in. hole at smallest point.
½-in. cap screw, 19/32-in. hole at smallest point.
⅝-in. cap screw, 23/32-in. hole at smallest point.
¾-in. cap screw, 27/32-in. hole at smallest point.
⅞-in. cap screw, 31/32-in. hole at smallest point.

Designing to Save Time in Drilling

The increase in drilling speed accomplished by not having to change drills will be considerable, so design pieces with the same size of holes and same size of tapped holes all over. Avoid designing holes smaller than can be made with ⅜-in. drills. This is the most economical size, as drills smaller than ⅜-in. feed slower, break oftener, choke up more easily. The choking up of drills by the chips is especially bad when jigs are used. The chips will not come out through the jig bushings, and the jigs can only be used to start the drill. The pieces must be taken out of the jig in order to finish the drilling.

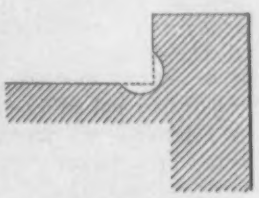


Fig. 2—Design of a Casting for a Turned Corner

The cost of making drilling jigs can be reduced if a few standard lay-outs are used. The drafting room should keep a table of all the different sizes of drilling templates that are used in the shop, and should design so as to utilize these wherever possible. Cast depressions or drill spottings wherever possible, to locate the drill. Work can be drilled faster by using this method of locating the holes than by any jig methods. It is better than laying out the work. as the one laying out on the pattern does for all time. It eliminates chucking time. It also has the advantage of being everlasting. A jig will wear out of true in a short time.

Designing to Save Lathe Time

Design turned corners with a groove in them so as they can be machined with the roughing tool, thus saving the time of putting in a square tool to finish the corner. See Fig. 2.

If an arbor must be used, make it short. A 1-in. arbor 12 in. long will spring before the work slips. Where the end of a piece that is turned on an arbor has to be faced off, have a relieved part cast in the end at the center. This will save changing tools to machine the corner next to the arbor.

Study Weaknesses Which Develop

Keep a list of repairs in order to find the weak points of your product. Strengthen the design of parts that wear or break. Breaks in machinery are sometimes caused not by weakness but by carelessness, or by some peculiar condition or strain that the particular machine is under. The cause should be found and the machine should be changed to make it foolproof. If this is impossible, at least the reason of the trouble is known and customers can be warned. This may be knowledge which your competitor does not possess, and you are then that much ahead of him.

A designer should have practical experience in the shop. He should not be afraid to discuss the points of his designs with foremen. He is not belittled by asking their opinions. Without their advice he may go far astray. For instance, consider the case of two rods to be held together by a long screw coupling. Suppose these rods must be roughly in line with each other. The design may be as shown in Fig. 3, Fig. 4 or Fig. 5.

The design in Fig. 3 first necessitates facing off the ends of the coupling. It requires the turning of the rod down to a shoulder which is expensive. It also requires threading in the engine lathe, as the thread must run up close to the shoulder. In doing this a great risk is run of getting a badly fitting thread.

The design shown in Fig. 4 looks fine on paper. The thread can be cut with a die. It is bad, though, because a facing operation is required on the ends of the coupling

and the assembling is made expensive since the rods will not be in line with each other on account of being threaded with a die and on account of the nuts not being true with the nut faces. These inaccuracies will require repeated scrapings of the nut faces to bring things right.

The design shown in Fig. 5 is the cheapest way. Thread the rods with a die. Screw them into the coupling until they butt together. Test the rods to see which way they are out of line. Drop the rods and coupling on some solid object so that only the coupling strikes. This will bend the rods slightly inside the coupling and line them up. Drill pin hole and ream where the rods butt together and then drive in a pin.

The design shown in Fig. 4 will not straighten so readily by dropping, because it will be more out of line and stiffer than that shown in Fig. 5. Any bending will have to come outside of the nuts where the rods are rigid. This illustration is given to show that a designer may not always select the best way. The one which on paper looks the cheapest may not prove so in practice. Every part of a design may have points like the above, hence it should be discussed with the pattern shop, foundry, machine and erecting shops.

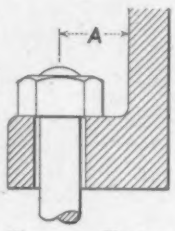


Fig. 6—Clearance Distance for Nuts

Some Fundamentals to Be Observed in Design

The little details of design are the places where money is made or lost. If the designer adopts the standards given below he will not be very far from the right track.

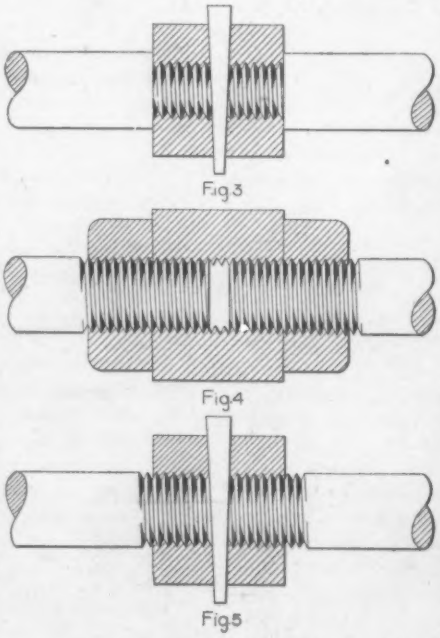
A complete box shape is thirteen times more rigid against torsion, and four times more rigid against bending than the same amount of material in the form of side plates and thin cross grids. A casting in the form of three sides of a box has one-tenth the strength of a complete four-sided casting. Note the strength of a pasteboard tube. Slit this tube from end to end and its strength is gone. The same is true of cast-iron sections.

Make the edge of flanges broad even if it takes a little extra metal. This gives a massive appearance to your machine often at little added but justifiable expense.

Use finished steel for all pins, rods, etc. Avoid turning of shoulders. A cheap way to make a shoulder, where there is no end thrust, is to slip a washer on the rod and hold it with a slit cotter. It is surprising in how many places a straight pin held with a couple of set screws could be used where the draftsman has designed with shoulders or taper ends. A straight pin, if practical, is cheaper than a taper pin. The reaming of a taper hole is a slow process and requires a new reamer.

Avoid small studs, as they are easily twisted off by the heavy handed.

Use cap screws with nut-sized heads where necessary. This will allow the casting or drilling of large clearance holes.



Three Ways of Designing a Rod Coupling

The Matter of Screw Threads

Even though it be an expensive change, necessitating the scrapping of many good taps and dies, adopt the U. S. standard thread. Its advantages are: Taps and dies bought from different makers will be of exactly the same size. V-thread taps made by different tap makers differ. There is no exact standard for the V-threads. Another advantage of the U. S. standard is it has a clearance at the top and bottom of the thread; that is, the very pointed edge of the threads on a bolt do not bear on the bottom groove of the thread of the tapped hole. This allows a leeway for wear of dies and taps, and makes the U. S. standard die or tap wear twice as long as a V-thread. The objection to the V-thread is that when the taps and dies are worn they will produce a threaded hole in which a bolt that is apparently a tight fit actually bears only at the points and not on the sides of the threads. Such a bolt will soon become loose.

Adopt a few standard sizes of holes, taps, pins, rods, bolts, etc., rather than many; even though they seem out of proportion, for in this way a smaller number of gauges will be required, few sizes of material need be kept in stock, the tool equipment will be reduced and a smaller tool room will be needed.

Use large clearance holes around cap screws and studs wherever possible to reduce the drilling and assembling costs. More time is spent accurately locating a drill than in drilling the hole. Large clearance holes will allow the use of badly worn jigs and will save the hand work in drawing over holes on the assembling floor.

Make all oil holes ⅜ in. Use ⅜-in. split cotters.

Never design so that a piece has to be threaded up close to a shoulder for this makes it impossible to thread with a die, and lathe threading is rarely accurate and is always expensive.

Clearance Around Nuts

The distance from the center of the stud to the nearest wall should be as in the table below. See sketch, Fig. 6.

Size of Stud, In.	Dimension A, Fig. 6. Center of Hole to Face of Wall, In.
½	9/16
½	¾
⅝	⅞
¾	1 1/16
⅞	1 3/16
1	1 5/16

The values in the table are the minimum distances. Lower values will make it necessary to back face under the nuts, and from 4 to 8 holes can be drilled in the time it takes to back face one bolt hole. Hence the importance of keeping nuts well away from the walls of the casting, especially if there is any considerable fillet in the corner or if the bolt circle is not concentric with the wall.

The designer can cause a great deal of confusion in the shop by giving names to pieces which do not fit. A simple rule for naming pieces is to call them by the two parts they connect. For instance, a lever link pin would be the pin that connects the lever and a link together. With this style of naming, any one can pick out the piece that is being talked about.

The Precision Die-Casting Company, Syracuse, N. Y., has moved into its new offices and factory. The new home was formerly the factory of the E. C. Stearns Mfg. Company, maker of the once famous Stearns bicycles. The Stearns Company continues to occupy a part of the building in the manufacture of sand-castings, hardware specialties and typewriters. The Precision Company reports greatly increased business and anticipates a record year.

The Dodge Mfg. Company, Mishawaka, Ind., through its Pittsburgh branch, received an order from the Pittsburgh Steel Products Company, Monessen, Pa., for a split iron sheave flywheel, 204 in. in diameter, 18-in. bore, with 16 V grooves. The wheel will be made in two parts and bolted together. The finished weight will be 120,000 lb. It will run 90 r.p.m. An order has also been placed with the same company for a 66 x 16-in. split sheave, 10-in. bore, to match the large wheel, the finished weight of this being 8500 lb.

Progress in By-Product Coke Manufacture

High Economy of Heat the Great Aim, Rather than Simplicity or Low Cost of Construction—Producer Gas to Heat the Ovens

Three papers dealing with the manufacture of coke were presented at the recent Cleveland meeting of the American Institute of Mining Engineers—one by W. H. Blauvelt, Semet-Solvay Company, Syracuse, N. Y.; another by C. W. Andrews, Duluth, Minn., and a third by F. E. Lucas, coke department Dominion Iron & Steel Company, Sydney, Nova Scotia. Extracts from these papers are given below, with some reference to points brought out in the discussion.

From William H. Blauvelt's Paper

Describing generally the process of coking in its earlier pages, the paper passes to the question of cost of bee-hive and by-product plants, and then in turn discusses some features of American retort oven practice, the application of heat to different types of ovens and the use of producer gas to heat ovens. We quote as follows, taking up these subjects in order:

Cost of Bee-Hive and By-Product Ovens

There has been much discussion regarding the relative cost of bee-hive and by-product oven plants. It is difficult to make an exact comparison, since the functions of the two types are quite different. For example, in many cases the cost of a by-product oven plant includes a large expenditure for coal storage of several hundred thousand tons, in order to take advantage of water freight rates. On the other hand, bee-hive plants are often built in connection with coal-mining plants and utilize a share of power plant, water supply, etc., without having these necessary adjuncts included in their capital account. Careful inquiry into the actual cost of bee-hive oven plants shows that to build such a plant complete in every respect, and in the best manner, including all the equipment besides the ovens and their immediate appurtenances, such as electric power plant, water supply, railroad approaches and sidings, coal handling, etc., would require an expenditure of about $950 per oven. The U. S. Geological Survey report for 1911 gives the tonnage of coke produced per active bee-hive oven at 466 tons per annum. This figure is doubtless low for the best bee-hive ovens; 675 to 700 tons per annum will perhaps represent fairly the average output per oven of a modern bee-hive plant. An average of these figures gives a plant cost of $1.38 per ton of coke produced per annum. A by-product oven plant of, say, 80 ovens, complete in every respect, and built in the best manner, would produce, say, 425,000 tons of coke per annum from an average coal, and would cost, say, $1,100,000. Of course, this figure would be varied by local conditions. This is equal to $2.58 per ton of coke per annum. On the basis of these figures a by-product plant costs 86 per cent. more than a bee-hive plant.

The owner of a small acreage of coking coal might perhaps well hesitate before making the larger investment, as compared with a simple plant of bee-hive ovens, but, as a general proposition, there hardly seems to be a question as to which style of oven is the better investment. Much of the additional cost of the by-product plant per unit of coke produced is, of course, due to the installation of the apparatus and buildings for the recovery and treatment of the by-products. Other important items are provisions for coal and coke storage, thereby assuring uniformity of operation and greater ability to maintain uniform deliveries. Moreover, a by-product plant is built for a longer life than a bee-hive plant. Eight years may perhaps be considered as a satisfactory life for a bee-hive oven plant, while double this term, or 16 years, would be several years within the life of a well-built by-product plant.

Non-Recovery By-Product Plants

Market conditions have not been such in this country as to justify construction of retort oven plants without the recovery of by-products, but we may assume a non-recovery oven plant built for operation in the Pocahontas region, for example. The yield of coke from Pocahontas coal averages certainly not more than 60 per cent. in a bee-hive oven. In a retort oven the yield is more than 80 per cent. Such a plant without by-product recovery costs not much more per ton of product than an equally well equipped bee-hive plant, and the labor of operation under such conditions would be as low, if not lower. A plant of retort ovens in place of bee-hives in that field would, therefore, mean that at practically the same expenditure the owner of a coal property would, on account of the greater yield of coke, increase the life of his coal field 33 per cent. with a given output of coke. Or the value of the property, based on the selling value of the coke therefrom, would be increased 33 per cent. The present development of the art, however, has brought the Pocahontas coal to the ovens located at the point of consumption, and the mixing of low and high volatile coals has grown in favor, especially during the last few years.

American Records in By-Product Coking

There has been great progress in the design of the ovens and recovery apparatus. As might be expected, America now leads Europe in output of plant, size of oven and rate of coking. In the early days of the by-product oven in America the capacity of the oven was about 4.4 tons of coal per 24 hr., and 25 ovens were considered about the right number for one crew of men. Modern ovens have a capacity of as much as 20 tons of coal per oven per day, and by the introduction of more machinery and more efficient design, the number of ovens handled per man is also increased greatly. The rate of coking is one point in which American practice has gone ahead of Europe.

Retort ovens have been built of various widths from about 14 to about 30 in., to suit various ideas of the designers and various coals; but within limits the rate of coking per inch of coal does not vary materially with the width of the oven. Not many years ago the best rate of coking was about 1 in. of oven width in 90 min.; that is, a 16-in. oven was coked in 24 hr. To-day there is more than one type of oven which is coking regularly at the rate of from 50 to 55 min. per inch of oven width. This increased rate was made possible partly by better control of the heating systems and partly by the adoption of silica brick in the oven construction. Silica brick has been used in bee-hive oven construction very generally for a number of years. In retort ovens it was first used in the Otto-Hoffman oven plant at Johnstown in 1899, and is now the standard material in America for retort-oven construction.

Heat Economy Paramount

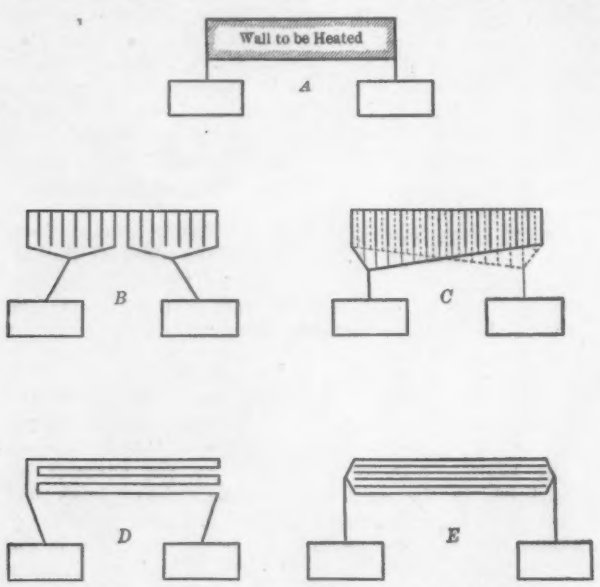
The tendency of modern retort construction, especially in America, is toward the highest economy of heat, even at the expense of simplicity and economy of construction. The proper heating of a retort oven is not a simple problem. It consists essentially in the distribution of heat from burning gases over the side wall of the oven, which presents an area from 35 to 40 ft. long and from 8 to 12 ft. high. The temperature over this entire area must be always under accurate control. When operating for maximum output the temperature must be held at a point not far below the softening point of the brick; and since the oven chamber is wider at one end than at the other, to permit easy discharge of the coke, the heats must be modified accordingly, so that the whole charge may be coked in the same time. It is also often desirable to maintain a somewhat lower temperature in the upper part of the oven. The combustion of the gas with air which has been preheated to, say, 1100 deg. C., as it is in the latest regenerator ovens, produces a theoretical flame temperature of about 2400 deg. C. The actual temperature produced would be much above the melting point of the best refractory brick, and while economical opera-

tion demands a full utilization of the best temperatures attainable, the walls of the combustion flues must not be injured, nor should there be "hot spots" or "white ends" that will overburn the coke in the adjacent part of the oven chamber.

Heat Application in Vertical Flue and Horizontal Flue Ovens

The illustration shows diagrammatically the application of the heat in the different types of ovens. *A* indicates the combustion flue system of any retort oven with its regenerative chambers below. *B* and *C* show applications of this general arrangement as adopted by oven systems employing vertical flues. *D* shows the application to the horizontal flue ovens of the series type. *E* is a horizontal type where all the flues are parallel. *B, C* and *D* represent the methods generally adopted in commercial ovens. In the former type, or the vertical flue oven, the gas and air are mingled and burned in horizontal flues at the bottom of the vertical flues, the burning gases distributing themselves and passing up one-half the vertical flues and down the other half, as indicated in the sketch; or gas and air are led separately to the bottom of each of the vertical flues, where they are mingled by properly arranged nozzles and burned as they pass upward. In some ovens a combination of these methods is adopted.

D illustrates the horizontal series flue regenerator oven; and as I have had more experience with this type, it may be of interest to discuss somewhat in detail the principles of its operation. All of the air required for the combustion is passed through the entire flue system, first from above downward, and then from below upward, as the regenerator system is reversed. The heating gas



Application of Heat in Different Types of Coke Ovens

is admitted at the end of the flues, usually in four or five places, as may be required. This method seems to give a maximum of simplicity. The flow of gas is automatically reversed in the flues themselves by the change in the current of air. Every flue may be conveniently inspected from end to end by a man walking along in front of the ovens, and the gas admission at each point is directly under his hand, so that there is no excuse for failure to immediately observe and correct any tendency to unequal heating. The distribution of the heat throughout the flue system is made remarkably uniform by this process. This is partly due to the comparatively high velocity of the gases sweeping through the flues and to the fact that the gas is burned either in a large excess of highly heated air or else in a mixture of air and products of combustion. The advantages of the presence of products of combustion in the combustion chamber, where it is desired to obtain a distribution of heat, have been clearly shown in other combustion processes, such as the Doherty system of producer operation, for example.

Ovens with Flues in Parallel

In beginning the experimental work leading up to the present method of operation, while it was recognized that the presence of a large volume of air, together with products of combustion mixed with the burning gas, was an important factor in distributing the heat with uniformity, yet it was feared that passing the entire volume of air through all the flue system might seriously increase the friction and make the maintenance of sufficient draft a difficult matter, even though the total amount of air admitted could be accurately proportioned so that it would be just sufficient to burn all the gas. Hence an oven was designed with the flues in parallel in order to reduce the velocity of the gas currents, following the principle of the vertical flue type. It was found, however, that the velocity of the gases passing through the flues did not produce material friction loss, but that most of the friction arose from eddies in the currents at the ends of the flues; and by a suitable modification of the structure at these points it was easy to keep down the draft required to a reasonable amount, while maintaining the velocity of flow that was so effective in securing uniform heats. This method of handling the gases through the flues in these series-flue ovens has, therefore, two advantages. It is effective in distributing the heat uniformly from one end of the flue to the other, and at the same time the higher velocities effect a more efficient transfer of heat through the flue wall. The effect of velocity of travel on the transfer of heat through walls has also been shown very clearly in a series of experiments on steam boilers made by the Engineering Experiment Station of the University of Illinois. It will be remembered that these tests were undertaken to determine the relation of heat transmission to velocity of circulation in the steam boiler. They show very clearly the important effect of velocity flow on rate of heat transmission, and from the deduction therein set forth it would appear that the same conclusions may be drawn in the study of our problem. Having obtained by these means such an effective distribution of the heat, the arrangement of gas admission to the flue system makes it easy to control the temperature of the whole system under the severe conditions described above. The result is that in this type of oven the heat is remarkably uniform from end to end, hot or cold spots are practically unknown, and the control of the temperature is much easier than ever before.

The temperatures maintained in the flue system depend, of course, upon the rate of coking it is desired to maintain. They usually run from 1000 deg. to 1250 deg. C., or somewhat higher. The temperature at the point of entrance of the heated air is controlled by the admission of the proper supply of gas, and additional gas is introduced at other points in the system in order to make up for the heat transmitted into the oven chamber, or to augment the temperatures as may be necessary in preserving the proper relations of heat in the different parts of the system. The periodical reversal of the gas currents prevents any tendency to inequalities which might otherwise develop.

Heat Economies

The perfecting of this system makes the regenerative retort oven quite as simple and easy to operate as the recuperative oven, and at the same time secures the maximum heat economy. There is only one reversing valve on each oven block, by which the currents of air and products of combustion are reversed through the system; and this may be easily operated by a simple mechanical device with time control. All the other advantages of the older system, of simplicity and reliability of operation, are maintained. This type of oven utilizes the principle of a heavy wall between each two oven chambers. This wall occupies some room, and therefore more space per unit of production, yet it has several material advantages. It supports the main body of the oven structure and carries without difficulty the weight of the heavy charging cars, which when loaded may weigh more than 20 tons. It permits that part of the oven structure which is subjected to the highest heats to be readily repaired, or even entirely replaced, without affecting the integrity of the main structure and also without stopping the adjacent ovens. In cases where the coal is hard on the oven bricks, or where a large percentage of water, as in washed coal, causes a severe shock to the red hot bricks when charged, or after the plant has become old, this is an important feature. Another value of these intermediate

walls is that they act as a reservoir of heat. They accumulate heat during the coking process, and when fresh coal is charged they come to the assistance of the burning gas and help the oven pick up its heat and maintain a coking temperature.

Producer Gas for Heating Ovens

One of the latest applications connecting the manufacture of coke with the other arts is the "gas oven." This name has been applied to the by-product coke oven when adapted especially to the manufacture of illuminating gas. The essential modification is that the gas for heating the ovens is obtained from producers, the ovens being modified to suit this gas, so that the whole of the gas produced from the distillation of the coal in the oven is available for sale as illuminating gas. This adaptation of the retort oven is attracting considerable attention; several plants are in operation in Europe, and three or four are beginning operation or are in the course of construction in the United States. While producing practically the same gas as other systems employed in coal gas manufacture, the gas oven has the advantage of producing a high quality of coke. It also has the advantage in operating cost, due to the employment of larger units, and carbonizing more coal per unit of labor. These plants are more especially adapted to the larger installations for gas manufacture.

One point in which by-product oven operation has improved in recent years is in reliability. In considering the gas, for example, either for gas engine work or for illuminating purposes, reliability of supply is an absolute essential; and while formerly the supply of gas was uncertain and undependable, contracts are now made which insure a permanent and reliable supply that can be depended upon, like any other manufactured product. The sales of oven gas for illuminating purposes now exceed 40,000,000 ft. per day.

The manufacture of by-product coke is coming to be not only an operation for the manufacture of coke and the saving of such incidental products as may be obtained, but rather an industry where coal is distilled for the purpose of producing several products, such as coke, tar, ammonia, benzol, gas and perhaps others, each made of the best quality and each important in maintaining the earnings of the plant. The growth of chemical manufactures in America and the greater demand for the products which supply these industries add permanency and reliability to the market, and at the same time the by-product oven furnishes a reliable supply of raw materials to important industries, which, although in some cases still in embryo here, have attained great proportions in Europe, and doubtless will grow to large importance in this country.

From C. W. Andrews's Paper

Mr. Andrews tells of the beginning of the by-product coke industry in the United States, in the building of 12 ovens at Syracuse, N. Y., in 1893, and names the plants that have been added in succession in the intervening years.

By-Product Plants in Central Districts

The author then takes up the question often asked, why by-product ovens are not being built more freely in the central coking districts.

The following statistics will fully answer this question: In 1907 the total production of coke in the United States was 40,780,000 tons, of which 5,608,000 tons was produced in by-product ovens, and 35,172,000 tons in bee-hive ovens. For the year 1910, which was the largest year in the history of the business, the total production was 41,709,000 tons, of which 7,139,000 tons was by-product and 34,570,000 tons was from bee-hive ovens. These data show an actual decrease of 600,000 tons compared with three years previous. The year 1911 made an even poorer showing for the bee-hive, as out of the 35,555,000 tons, 7,848,000 tons was by-product and 27,707,000 tons from bee-hive ovens. As a very large proportion of the total bee-hive coke is produced in the central coking district, it will readily be seen that the present bee-hive ovens are ample to take care of the demand during ordinary years; consequently if the by-product plants were built by the present operators it would result in the loss of the large investment in bee-hive ovens necessary for a corresponding output. In addition the operators would practically be unable profitably to sell the gas for illuminating purposes, owing to the competition of natural gas. There is no doubt that the gradual exhaustion of the coal and gas fields will eventually lead to the use of by-product ovens throughout the district, since the increase of practically 10 per cent. in yield obtained by the by-product ovens, and a market for illuminating gas will eventually become of enough importance to justify the move.

The completion of the plant of the Lehigh Coke Company, near Bethlehem, Pa., and that of the Minnesota Steel Company, at Duluth, together with others in prospect, will soon make most of the steel plants outside of the Pittsburgh district self-contained so far as the coke supply is concerned. There is no doubt in my mind that the by-product ovens will take the place of natural gas in a large number of cities in the central States as soon as the supply of natural gas begins to fail.

The Use of Lean Gas to Heat Ovens

As far back as 1898 the use of producer gas to heat the ovens either wholly or in part was suggested by Dr. Schniewind, and I believe that an experimental installation was actually made at Boston for this purpose. Its use, however, was not extended, owing to various reasons. Within the last two or three years, however, conditions at certain points have become more favorable for this form of gas production, and several systems have been devised whereby combination ovens are constructed. These ovens are so designed that either producer gas or lean oven gas can be used for heating the brick work. In this way the ovens can be designed to take care of the summer consumption under most favorable conditions, and a producer gas plant can take care of the increase in the winter consumption. This development will, no doubt, lead to the construction of a large number of comparatively small by-product plants throughout the United States. These plants would ordinarily make sufficient metallurgical coke to supply the needs of the local foundries and sell the remainder of the production for domestic use.

Apparently the final result of by-product oven construction will be the gradual spread of coke manufacture over practically the whole country, instead of in the coking coal districts. This would result in the conservation of our coking coal supplies, as not only is a larger yield obtained, but also it is feasible to use coals which are not ordinarily considered suitable for coking in bee-hive ovens. The saving of residuals, such as tar, ammonia and illuminating gas, is also of decided commercial importance, since in the United States, before long, will be used large quantities of ammonium sulphate in the manufacture of fertilizers, creosote oil for wood preservation and pitch for briquetting certain grades of coal. The domestic sizes of by-product coke are fully equal to anthracite in efficiency, and will form a welcome substitute as the anthracite production diminishes.

From F. E. Lucas's Paper

Mr. Lucas presents the results of some years of experience in the operation and construction of by-product coke ovens and of observation of plants in this country and Europe. He considers that the by-product oven should stand second to none as an economic factor in the industrial world. Among other things he says:

Washing and Compression of Coal

One thing I would emphasize is that any one type of plant does not necessarily work to the best advantage in every coal. Each coal should be carefully studied and tested by all possible means before erecting any plant to prepare it for coking. Different coals have different specific gravities, and the ratio between the specific gravity of the coal and that of the impurities also varies greatly in different coals. The manner in which the impurities are associated with the coal also varies greatly, and this in particular will largely affect the size to which the coal should be crushed before washing. We find that some coals will give the best results in washing by crushing to a small size before going to the washer and others give the best results by going to the washer in nut size. In crushing finely before washing it is often the case that where the sulphur is contained in definite strata of pyrites

a large part of the pyrites is crushed to dust or flake form, which is held in suspension in the washer and goes over with the coal. When washing the coarser coal it is (more often than not) found advisable after washing to recrush to the degree of fineness which experience shows will give the best results in the coke for that particular coal.

A further preparation, with which, so far, we have not had to bother much in America, is the compression of the coal into cakes before charging. There are coals which when charged loosely into the oven either will not bond at all or will not bond sufficiently to make a coke that will stand handling, but which, when crushed very fine and stamped into a cake that can be pushed into the oven, will make a good coke.

It is sometimes claimed that all coal should be stamped before charging, but I cannot agree with that claim for this reason: a large open cell-structure in the coke, provided the cell walls are strong enough to carry the burden, gives us a calorific intensity or fierceness of combustion which it is not possible to attain by the use of a dense, close-grained coke; and compressing a coal which gives us under natural conditions such a coke as we desire, only closes in the cell-structure and makes a heavier and denser coke, so that the consumption of coke in a furnace per ton of metal produced would, I believe, be higher, since practically the same bulk, and therefore greater weight, would be used.

However, this does not alter the fact that in many cases compression of the charge is of incalculable benefit to the quality of the coke produced, and as our better coking coals become exhausted, we shall doubtless find it necessary to resort more largely to both washing and compression in order to keep up the coke standard. Of course, that will make the coal going to the ovens cost more than at present; but we shall find that other savings can be effected which will more than offset this added cost.

Both washing and compression are almost universally practiced in Europe, but in spite of this we find that the consumption of coke per ton of metal produced is about on a par with the general practice in America, when the quality of the ores and other conditions are considered. Also, we find that the European countries, particularly England, Germany and Belgium, in spite of the fact that the bulk of their coal has to be prepared for coking, and that they are in general using much leaner ores, can compete very successfully in the world's markets with America, which as yet has not been to any great extent confronted with the conditions which obtain on the other side. What they have done we can do, and one of the chief reasons why they can compete is because of their avoidance of waste and their economy in small things.

Effects of Moisture in the Coke

After describing the various steps in by-product recovery, the paper took up the question of quenching and of moisture in the coke:

The quenching of the coke is important from both the standpoints of moisture content and of strength. If the coke gets too much water the cells will suck themselves full as they cool, and there will not be heat enough left to expel this excessive moisture. At the same time, the rapid formation of steam has a tendency to crack the coke and weaken it materially. The ideal quenching of coke can, I think, be shown by immersing a piece in water, just for a moment, immediately after it comes from the ovens, and then leaving it for about 20 min. The water has just chilled the outside and stopped any tendency to combustion there. The inside will die out for want of air, and at the same time there will be sufficient heat to dry out the moisture from the outer cells. It is probably not possible in actual practice to get such results as we would in a small experiment, but the nearer we approach to it the better the product will be.

The effect of moisture in the coke is one on which opinions may differ. Even if the moisture is determined and only dry coke paid for, there is still the question of freight, which is an important one when large quantities of coke are being used.

The effect of moisture in the coke on the action of the furnace or cupola itself is not so clear to me. In the foundry cupola, where the ratio of coke to iron melted is so low and the distance between the top and the melting zone so short, I can readily see how the question of moisture may be very important; but in the blast furnace we have a very different condition. I do not see how a reasonable amount of moisture in the coke can affect the melting zone of the furnace or the reducing action of the gas on the ore. There is a temperature at the top of the furnace, where the coke is charged, high enough to dry out the moisture thoroughly before the coke gets far enough down to do any good, and the moisture is carried off with the gas. In fact, I believe there are some furnace plants where the coke is sprayed with water before charging, in order to keep the top heat down below the danger limit.

Then comes the question of the effect of the moisture on the gas itself. As long as the moisture is not high enough to limit the heats required to be raised on the stoves, I cannot see that it has done any harm.

The effect of longer or shorter coking hours or higher or lower temperatures on the quality of the coke is something that can only be determined by actual experiment with each different kind of coal. We can make laboratory tests on a small scale to test the coking qualities of a coal and its yield of by-products, but I would not care to build a plant to deal with a certain coal and base my calculations entirely on laboratory tests.

Surplus Gas and Its Uses

A modern by-product oven, run at a reasonable capacity, will give 50 per cent. or more of surplus gas from a coal of about 28 per cent. volatile content. The surplus gas is the gas over and above the quantity needed to keep the oven up to the required temperature. This surplus gas should run from 450 to 500 B.t.u. per cubic foot. The quantity of surplus gas is approximately 5000 cu. ft.; hence $5000 \times 450 = 2{,}250{,}000$ B.t.u. per ton of coal carbonized is available for the production of power = 93,750 B.t.u. per hour. The builders of gas engines tell us we can get 1 hp. on a heat consumption of 11,000 B.t.u. On that basis we find 8.5 hp. per hour from the surplus gas from 1 ton of coal.

The surplus gas can also be used for illuminating purposes. This is done at some plants in this country and at a great many in Germany. By installing two collecting mains on top of the ovens, the rich gas, given off during the earlier hours of the coking time, can be collected in one main and the leaner gas in the second. By this means gas of 650 to 750 B.t.u., or from 16 to 19 candle-power, can be delivered direct from the ovens without enriching. The lean gas is still of sufficiently high calorific value for heating the ovens. Gas from by-product ovens can be piped for hundreds of miles if necessary. Again, the gas may be used for steam raising or for heating all manner of furnaces, or, in conjunction with steel works, can be used in a steel furnace instead of producer gas. The recent investigations by Professor Bone have shown how by flameless combustion we can get 95 per cent. of efficiency out of the gas we burn. In any of the above ways the gas can be used with great economy; but I believe the production of power from gas engines opens up the largest field.

Loss from Bee-Hive Ovens Calculated

In the year 1911 there was produced in America approximately 29,338,000 tons of coke, of which approximately 21,448,,0000 tons was produced in bee-hive ovens. I do not know the figures for the average volatile content of the coal that went to make this coke, but assuming a fairly low volatile coal of, say, 24 per cent., to produce 21,000,000 tons of coke in by-product ovens would take about 26,000,000 tons of such coal. Allowing the small amount of 4000 cu. ft. of surplus gas per ton of coal, and 15 lb. of ammonium sulphate, and 7 gal. of tar, and allowing the surplus gas to furnish only 400 B.t.u. per cubic foot, we find that we would have $26{,}000{,}000 \times 4000 = 104{,}000{,}000{,}000$ cu. ft. of gas per year; this at 400 B.t.u. per cubic foot = 41,600,000,000,000 B.t.u.; reduced to hours = 4,748,858,447 B.t.u. at 11,000 B.t.u. per horse-power-hour = 431,714 hp. Or, allowing the value of 10 cents per 1000 cu. ft. for the gas, we have the sum of $10,400,000. Of ammonium sulphate we have 174,107 gross tons at a value of approximately $60 per ton = $10,446,420. Of tar we have 182,000,000 gal., worth, at 2 cents per gallon, $3,640,000. Total value of gas, ammonia and tar, $24,486,420.

The above amount is 7 per cent. on about $350,000,000,

a sum which would build by-product ovens enough to carbonize 125,000,000 tons of coal yearly. Besides this loss there has been the loss of the coal burned in the bee-hive oven. Allowing 64 per cent. as a fair yield for the bee-hive and 78 per cent. for the by-product ovens, there would be a loss exceeding 6,000,000 tons of coal. This at $1 per ton added to the other loss gives us a grand total of over $30,000,000 lost in one year. It seems to me that this is well worth "getting after."

Comparison Between Bee-Hive and By-Product Ovens

Bee-Hive Ovens.

Ordinary type, 12.5 ft. in diameter.

Cost from $700 to $1,200 per oven.

Produces 4 net tons of coke in 48 hr. = 2 net tons in 24 hr.

Yield of coke from coal, 60 per cent.

By-products and surplus gas = none.

By-Product Ovens.

Oven charge, 9 tons.

Coking time, 24 hr.

(Ovens may be larger or smaller than this, but 9 tons would probably be about the average charge for the modern type of oven.)

Coke produced on 70 per cent. yield = 6.3 tons of coke per oven in 24 hr.

By-Products:

Ammonium sulphate, 22 lb. per net ton of coal = 31 lb. per net ton of coke. Value, 2.25 cents per pound above cost of manufacture = 70 cents per ton of coke made.

Tar, 8.5 gal. per ton of coal = 10.7 gal. per ton of coke, at 2 cents per gallon = 21 per ton of coke.

Surplus gas, 5000 cu. ft. per ton of coal = 7143 cu. ft. per ton of coke, at 10 cents per 1000 cu. ft. = 71 cents per ton of coke.

Total Value of By-products as Above

Ammonium sulphate	$0.70
Tar	0.21
Gas	0.71
	$1.62 per ton of coke

Add to the above the difference between 60 per cent. yield in bee-hive ovens and 70 per cent. in by-product ovens on the same coal. Taking coal at $1.50 per ton:

Coal per ton of coke produced in bee-hive oven	= $2.50
Coal per ton of coke produced in by-product oven	= 2.14
Balance in favor of by-product oven	= $0.36

So that the total saving in coal and by-products equals $1.62 + $0.36 = $1.98 per ton of coke made = $12.47 per oven in 24 hr. = $4,551.55 per oven per year. Or for by-products alone, without saving in coal, $3,723 per oven per year.

For a plant of 100 ovens, saving = $455,155 per year.

Cost of 100-oven plant complete, approximately $1,000,000. A 100-oven plant of above capacity will produce 630 tons of coke per day = 229,950 tons per year, working on 24 hr. coking time.

If benzol is recovered it will further add to the income from by-products.

Discussion

The three papers were discussed together, though chief consideration was given to that of Mr. Blauvelt. J. E. Thropp, Jr., Indiana Harbor, Ind., asked why by-product coke sold at a premium for foundry use if for that purpose the cell structure is preferably soft and with thick walls. Mr. Blauvelt answered that the tendency is toward different conditions of manufacture for foundry and furnace coke respectively. Cell structure has not reached perfection yet, but progress is being made. Blast furnace coke with hard cell walls and well developed cells is produced in by-product ovens under high heat, 16 hours being given to such coke and 20 hours to foundry coke in the same oven. Foundrymen call for thick walled coke. The selection of coals and the mixing which is possible with by-product ovens gives the foundryman just what he wants. The percentage of carbon can also be raised.

A question was asked as to the swelling of coal in coking and what had been done mechanically to meet it. Mr. Blauvelt said that many low volatile coals swell badly, and the force exerted is sometimes enormous. The remedy is found in mixing such coals with others which counteract the swelling tendency. Some comment was made on the relation of oxygen content in coal to its availability for the production of coke. Dr. F. Schniewind, of the United Coke & Gas Company, replied that oxygen content alone is not a deciding factor, but the relation of oxygen to hydrogen. Their combination is in the proportion of 8 parts oxygen to 1 of hydrogen. Coking quality depends on the amount of disposable hydrogen remaining in the coal, the amount that becomes available for combination with carbon to form hydrocarbons.

Vertical Versus Horizontal Flues

In commenting on Mr. Blauvelt's paper, Dr. Schniewind said that it went to the root of the whole matter of by-product coke oven design. The regenerator was originally introduced by Mr. Hoffman in 1881 and the adaptations made by Mr. Otto resulted in the Otto-Hoffman oven which was a combination of the Coppée vertical flue oven with the Hoffman regenerator. By far the majority of by-product ovens in Europe are of vertical flue design. The general practice has been the conduct of gases of combustion in a vertical direction—the hot blast stove, for example. Some of the statements made by Mr. Blauvelt in describing the operation of the horizontal series flue regenerator oven were contrary to the experience of the speaker. He had found that slow travel of the gases through the flues and the absolute exclusion of inert gases are essential. Mr. Blauvelt in his advocacy of high velocity of travel had cited the experiments on steam boilers at the University of Illinois as showing the effect of velocity of flow on rate of heat transmission; but the conditions in a boiler are very different from those in a coke oven. In a steam boiler heat transmission is entirely by convection, while in a coke oven it is practically entirely by radiation. While it is true that with a boiler the greater the velocity the greater the transfer of heat, in the coke oven, where heat is transmitted by radiation, it is not necessary to move the gases so fast, and the less the amount of inert material carried along the less the difficulties. The thick partition walls in the Semet-Solvay oven the speaker considered a detriment. He could not see how the difference of heat between the admission end and the discharge end was obtained in the case of the horizontal flue, in view of the enormously high rate of travel of the gases. In reply Mr. Blauvelt said that more heat was secured at the wide end of the Semet-Solvay oven by simply furnishing more gas at that end. There is only one reversing valve, which is at the end of the block, and controls the whole operation. He added that one of the principal advantages of the middle wall was that it served as a reservoir of heat. In the coking operation the walls are heated up to over 1000 deg. C., the coke is pushed out and then the oven is charged with coal dripping with water. Just there the thick wall comes in, helping the combustion system to catch up. In confirmation of what had been said previously in the discussion, Mr. Blauvelt emphasized the fact that the retort oven is attracting the attention of the illuminating gas man as an efficient instrument for his purpose as never before.

Tar as Fuel for Open-Hearth Furnaces

Bradley Stoughton cited the interesting fact that the use of tar in open-hearth furnaces has been taken up in this country, one large steel company having experimented with it quite successfully in this way. If such use should spread it would help to answer the question that has been raised as to the ability of the market to absorb the by-products of retort coking. Mr. Stoughton's reference was probably to the practice of the Gary, Ind., open hearth plant where two furnaces in group No. 1 are employing tar as fuel exclusively. The tar comes from the nearby by-product coke ovens. The burners are similar to those employed for fuel oil, a steam jet being used for the atomizing of the tar.

E. W. Parker, U. S. Geological Survey, Washington, D. C., said that last year the value of by-products obtained from retort coke ovens was equal to the value of the coal charged into the ovens. Thus the operation of coking was without cost to the owner. The amount of energy that is dissipated in the gases from beehive ovens in the Connellsville region, if it were utilized by burning the gases under boilers to produce electric power, is double the power necessary to move every train on the Pennsylvania Railroad between Pittsburgh and Harrisburg.

ESTABLISHED 1855

THE IRON AGE

Published Every Thursday by the

David Williams Company

239 West 39th Street New York

W. H. Taylor - *President and Treasurer*
I. A. Mekeel - - - *First Vice-President*
Fritz J. Frank - - - - - *Secretary*
M. C. Robbins - - - *General Manager*

Editors

Geo. W. Cope A. I. Findley W. W. Macon

Charles S. Baur - - *Advertising Manager*

Branch Offices

Chicago: Otis Building Philadelphia: Real Estate Trust Bldg.
Pittsburgh: Park Building Cleveland: American Trust Building
Boston: Compton Building Cincinnati: Mercantile Library Bldg.

Entered at the New York Post Office as Second-class Mail Matter

Subscription price: United States and Mexico, $5.00 per year; to Canada, $7.50 per year; to other foreign countries, $10.00 per year.

CONTENTS.

The New National Administration

After a lapse of 16 years the Democratic party has been intrusted with the control of the National Government. By an unprecedented majority in the electoral college Woodrow Wilson has been made the choice of the American people for President. His party has also been given control of both houses of Congress. The Democratic party, after March 4, 1913, therefore, will be in position to put in full effect its own policy regarding the manner in which the affairs of this country shall be conducted. The possibilities of this great change in the complexion of the Government, which has placed the law-making power in the hands of a party opposed to any form of protection, are receiving earnest consideration.

Knowing the fear which business interests entertain regarding radical tariff changes, the President-elect has expressed his economic views with much moderation. In the course of the recent campaign he has taken pains to assure the country that he does not believe free trade to be practicable, but that it will simply be his endeavor to remove from the tariff schedules such measures of injustice or inequality as have either favored particular interests or have injured others and prevented their proper development. On the day following the election he issued a statement from which we take the following extract: "There is absolutely nothing for the honest and enlightened business men of the country to fear. No man whose business is conducted without violation of the right of free competition, without such private understandings and secret alliances as violate the principle of our law and the policy of all wholesome commerce and enterprise, need fear either interference or embarrassment from the administration. Our hope and purpose is now to bring all the free forces of the nation into active and intelligent co-operation and to give to our prosperity a freshness and spirit and a confidence such as it has not had in our time."

The President-elect, however, is not the only power in the new regime with which the country will have to deal. While the Executive may suggest and to some extent may endeavor to direct legislation, the power to enact laws rests with Congress. There are many Senators and Representatives who will have a prominent part in the councils of his party after March 4 who do not express themselves so temperately and judiciously. They announce themselves as in favor of an extra session of Congress next spring for the purpose of entering upon tariff legislation at once with a view to reducing heavily the present rates of duty and to sweep away most of the protection now extended to manufacturing industries. It is announced by some of these gentlemen that a strong effort will be made to press to early enactment the several tariff measures recently passed by Congress and vetoed by President Taft.

It is assumed by many that the manufacturing industries of this country are now so thoroughly established that the tariff can be greatly reduced, or could in fact be wiped out, without material injury to such industries. Those who hold this belief evidently have in mind equitable treatment of all domestic interests under tariff revision. Under such a scheme of revision the country would speedily adjust itself, not without some sacrifices and perhaps some financial disturbance, and business would then be conducted on a somewhat different basis, but in orderly relation so far as the

various producing and consuming interests are concerned. If, however, we are to take the metal schedule prepared by Representative Underwood and vetoed by President Taft as a sample of the kind of tariff legislation to be expected, there will be decided injury to important interests. That schedule did not treat all iron and steel interests equitably, but left some with a fair measure of protection while subjecting others to free competition from foreign manufacturers. Illogical, haphazard and disjointed legislation such as this is what the country has to fear.

Taking the iron and steel industry as a whole, no widespread disaster would be inflicted by even a sharp reduction in the present low rates of duty. The iron and steel industry has been quite severely dealt with in revisions of the tariff which have occurred in the last 25 years, and rates of duty are now so low that importations are possible at points along the Gulf of Mexico and on the Pacific coast. Further reductions of duty would enable foreign iron and steel products to penetrate some distance into the interior, but the very great bulk of the iron and steel consumption in this country would still be supplied by our own manufacturers. The iron markets of the world would have to be in exceedingly bad shape to make available for the supply of American consumers any considerable tonnage of the iron and steel produced in Europe. It is, however, idle to believe that the singling out of certain products for the free list would not subject the manufacturers in those lines to serious trouble.

As an example of the effect of inequitable tariff legislation it may be recalled that, notwithstanding the steady and sometimes rapid growth of the production of iron and steel in this country, it was not until well along in the 90's that it was possible to establish here the manufacture of tin plate. The tin plate industry has its natural place with other industries in the iron and steel trades, and its development should have proceeded regularly with the advancement in other lines. Until an adequate protective duty was laid on tin plates, however, by the enactment of the McKinley bill in 1890, it was impossible to establish the industry here, although frequent attempts were made by enterprising citizens. Well-established industries would hardly be wiped out completely by the removal of the duty on their products, yet as employers in such industries would be obliged to pay as high wages as those paid in protected lines it can readily be seen that they would be put to such great disadvantage that employers who could do so would be likely to withdraw gradually from such unprofitable and unpromising branches of trade and devote their energies to others promising better returns.

Much satisfaction is being expressed over the fact that the change in the political control of this country comes at a time when European iron and steel manufacturers are better engaged than they have been for very many years, so that their prices are fully as high as those prevailing in this country and in some branches of the iron and steel trade are even higher. It is argued from this fact that any economic changes contemplated may be put in effect without fear of injury to American interests. Those who take this view, however, should bear in mind that the conditions now existing are abnormal. It is impossible to predict how long this state of affairs can continue. It may run along for several months or even a year or two. The end will come, however, and then prices in Europe will fall much below their present level and be considerably under those prevailing in the United States. This is sure to come, because European wages have advanced very slightly under present trade conditions and are much below the wages prevailing in this country in the same branches of trade. Labor cost is the great controlling factor in international competition. Granted equal skill and the possession of equal manufacturing appliances, the country paying the lowest wages can capture the business. With much lower duties on iron and steel in this country, and European manufacturers eager to keep their furnaces and mills employed, the market of this country would undoubtedly be invaded. Even if foreign manufacturers should be able to take but ten per cent. of the iron and steel business of this country, the loss of that ten per cent. would unquestionably have a serious effect on the prosperity of the American iron and steel trades.

The Manganese Position

In the summer of 1911 ferromanganese ruled at $36.50, Baltimore, and the supply was entirely adequate. Since then the market has risen, the advance being particularly rapid in the past six months, until a position was reached last week in which a quotation of $61, Baltimore, on contract material became purely nominal, while much higher prices have been paid for prompt shipment. Despite the high prices obtainable, the supply apears to be very limited, and there is naturally a desire for the statistics bearing upon the situation, to determine if possible how much of the scarcity is due to increased consumption and how much of it to failure in the supply. We have put together the statistics bearing upon the situation and present them herewith, the figures covering the imports by quarters for two years, of ferromanganese and spiegeleisen, and the production by half years.

Imports of Ferromanganese and Spiegeleisen, Fiscal Years, Gross tons.

	Ferromanganese		Spiegeleisen	
	1910-11	1911-12	1910-11	1911-12
September quarter	33,491	15,439	2,399	4,815
December quarter	25,670	18,457	9,266	2,805
March quarter	25,170	20,593	3,848	50
June quarter	21,197	21,592	9,502	170
Fiscal year	105,528	76,081	25,015	7,840

Production of Ferromanganese and Spiegeleisen, Gross Tons

	Ferromanganese	Spiegeleisen
July-December, 1910	26,000	68,453
January-June, 1911	34,166	43,429
Fiscal year, 1911	60,166	111,882
July-December, 1911	40,316	66,806
January-June, 1912	57,016	36,145
Fiscal year, 1912	97,332	103,951

Imports Plus Production, Ferromanganese and Spiegeleisen, Gross Tons

	Ferromanganese	Spiegeleisen
Fiscal year, 1911:		
Imports	105,528	25,015
Production	60,166	111,882
Total	165,694	136,897
Fiscal year, 1912:		
Imports	76,081	7,840
Production	97,332	103,951
Total	173,413	111,791

In July, August and September of 1910 ferromanganese imports amounted to 33,491 gross tons, then they decreased steadily until in the same period in 1911 they amounted to only 15,439 tons. Later came an increase, but only a slight one. Imports in April, May and June of this year amounted to 21,592 tons. Spiegeleisen imports were inconsequential in the two years under review. The domestic production of ferromanganese, on the other hand, has increased steadily so

that while only 26,000 tons was produced in the second half of 1910, no less than 57,016 tons was produced in the first half of the current year. The production of spiegeleisen followed a different course, being heavy in the second halves of 1910 and 1911, and light in the first halves of 1911 and 1912, with the result that fiscal year totals showed no important change, there being a slight decrease.

Combining the imports and domestic production, it is found that the supply in the 12 months ended June, 1911, was 165,694 tons of ferromanganese and 136,897 tons of spiegeleisen, while in the next 12 months, ending June, 1912, the supply was 173,413 tons of ferromanganese and 111,791 tons of spiegeleisen. Thus the supply of ferromanganese increased, from one twelvemonth to the next, by 7719 tons, while the supply of spiegeleisen decreased 25,106 tons. These tonnages practically balance, having regard to the smaller manganese content of spiegeleisen, so that it may be said that the total supply of manganese metal was about the same in the twelvemonth ended last June as it was in the preceding twelvemonth.

The supply of manganese, therefore, has been substantially the same in the two fiscal years ended June, 1911, and June, 1912, respectively. Not so with the demand, which varies almost precisely with the production of steel. While we have no comparable statistics for steel production, we have our records of production of pig iron by the steel works blast furnaces and they constitute a fairly accurate index to steel mill operations. The production of pig iron by steel works has been as follows, according to our monthly blast furnace reports:

Year ended June 30.

1911.....	15,950,138 gross tons
1912.....	19,174,563 gross tons

Here is an increase in production of pig iron by the steel works of 20 per cent., suggesting a somewhat similar increase in the production of steel and, necessarily, in the consumption of ferromanganese and spiegeleisen, whereas the figures of imports and production show that the supply underwent practically no increase. The conclusion is unavoidable that the supply has not kept pace with the demand.

Correspondence

The High Cost of Living

To the Editor: Many writers ascribe the present high cost of living to the increased production of gold, others to the tariff, some to the trusts, etc. Thomas W. Lawson, in a recent magazine article, maintains it is due to the manipulation of the Stock Exchange, whereby there has been forty billion dollars' worth of stock and bonds sold to the public, all based on fictitious values—over-capitalized industries—which at 5 per cent., requires two thousand million dollars of the annual production of wealth as interest. I do not believe that any one of these explanations is the complete or correct solution of this great ecenomic puzzle of the present day.

Not Due to the Increased Gold Supply

We must go deeper into the causes of things and get back to the basic principles of political economy to find the true solution. If it is due to the increase in the supply of gold, then all commodities should—in a reasonable degree, at least—increase alike, even admitting that wages would be the last to rise. If the gold in a country were to be doubled, the natural economic law would be that a bushel of corn, a pair of shoes, or a day's wages, would purchase just twice as much gold as before the increase; but this is very far from the fact. In 1894, in Kansas, it took 600 bushels of corn to purchase a $60 farm wagon. Today that same wagon is worth only $75, while 600 bushels of corn are worth $300. A good cook stove can be purchased today at practically as low a price as at any time in the past 20 years. A day's wages at the present time will buy as much wagon or cook stove and more of many products than at any time in the past; but a day's labor or a given quantity of gold will not purchase as much food supply or any other article based on the production of agriculture. There is today too great a variation in the prices of different commodities to be explained by the increase in the supply of gold alone.

Not Due to Over-Capitalization

Neither is Mr. Lawson right. Business and enterprise are capitalized and always have been on the earning power, and not on what it costs to produce. A man may have a business that cost only $1,000 that will net a profit of $1,000 each year. This business could be capitalized on a 5 per cent. basis at $20,000, or 20 to 1, and as long as competition permits this man to enjoy his large profit he and his stockholders will derive a 5 per cent. income on a fictitious capital of $19,000 over and above the cost. But there will come a time when idle capital will compete with him and cut down the 100 per cent. profit and destroy the fictitious $19,000 capital.

Sources of Wealth

To obtain a clear conception of this problem, let us go back to first principles: According to Adam Smith's "Wealth of Nations," the total annual production of wealth is divided into three parts, namely, wages, rent and profit on capital. The law of wages is the least amount that the laborer and his family can live on; that is, procure food, clothing, shelter, taxes and the few other necessities of life that are needed to maintain him in the condition to continue to labor. It could not be less without the destruction of labor, which would injure both the landlord and capitalist—employers of labor.

Take the case of a tenant on land. He must retain as his wages, in addition to what he and his family consume, the necessary seed for replanting his land, also the interest or profit and upkeep on what capital he employs, such as horses, farm machinery, taxes, etc. Anything else would destroy his efficiency to the injury of the landlord. All the rest of his annual production can go to the part called "rent."

The same is true with the manufacturer. He must retain enough of his annual production to furnish, for the coming year, wages, replacement of raw material consumed, taxes, and depreciation on his plant. With anything less he could not continue to maintain and run his business. All the rest of his annual production can go to the "profit on capital."

Part of Wealth Set Aside by Provident People

Now this surplus production of wealth called "rent" and "profit on capital" is not needed in reproduction under the old standard of living, except a certain part which provident people would set aside to provide for the growth of the community and the natural increase of consumption. This part I will call the XY per cent.

All the surplus "rent profit" and "capital profit" above these amounts can, as long as the plane of living remains the same, be wholly destroyed, or used for war, the building of great canals and navies, or be used for the purchase of luxuries or stock gambling, or almost any purpose without disturbing the labor and capital required for reproduction.

The great accumulations of capital mostly come from this surplus of "rent" and "capital profit," and the only way this capital can disturb the reproduction of the food supplies and the necessities of the community is by offering a greater attraction to labor which will cause it to leave the farm and the manufacture of the necessities of life.

Labor Leaves the Farm for More Profitable Work

That is exactly what is being done at the present time, which is the principal cause of the present high cost of

living. The statistics show that the products of the farm are not keeping pace with the increased consumption—not because of any shortage of land or of capital, but because in the great industrial growth of the last 15 years the whole swing of capital and labor has been used in the creation of a higher standard of living, and has drifted away from agricultural production to other and more profitable fields of endeavor.

The combining of great business enterprises, with the consequent inflation of their capital values many times beyond the cost of asset values, makes it necessary to protect this heavy increased capitalization. To do this, vast amounts of capital have had to be converted into "fixed capital," such as ore, coal and mineral supplies and enlarged plants. The greater profits of newer undertakings, such as the automobile industry, together with the many others of a similar nature, all cater to the demands of the higher standard of living. They are made possible by the great increase in this surplus capital, and have had a tendency to rob the farmer and more humble industries both of the XY per cent. of capital and also the extra labor needed to increase production in keeping with the increasing consumption.

As an example of the rapid increase in capital, all of which must use labor to find employment, take the $1,400,000,000 capitalization of the United States Steel Corporation. Over half of it was watered stock, as shown by the Congressional investigation, being far above the original cost of its various plants. It is no secret in financial circles that practically all of the common stock of big business is at the start purely water, with no "cost value" back of it, and only the prospect of increased earning power to make it valuable. The sale of these securities both at home and abroad has produced a vast addition to active capital to absorb labor.

As another example, only a few years ago the demand for machinists was so great in the automobile industry as nearly to cripple the old line industries which employ many machinists. Even the farmer's maidservant, whom he used to hire for $2 or $3 per week, will not remain on the farm when she can get $5 or $7 per week in the city, and do less work at the same time.

When a country changes from a lower to a higher plane of living, which is the result of almost every period of great and prolonged national prosperity, the new resulting industries, always at first more profitable than the old, attract labor and capital in undue proportion, and upset the old balance of things. As an example, in Illinois we own over 60,000 automobiles, having, say, $15,000,000 invested, with an annual figure of $1000 per year, as "upkeep and depreciation" for each, which is $6,000,000 per year for the cost of maintenance alone. They are in the class of luxuries, mostly used for pleasure. Compare this present plane of living, on only one item, with the cost and upkeep of the horse and carriage of 15 years ago, which satisfied the same man who now owns a $2500 car.

Equilibrium Must Be Restored

We have upset the equilibrium of things. We have robbed the XY per cent. of capital and labor of the landlord and farmer and producer, and it is no wonder that we have the high cost of living. Take the average Western landlord farmer: Ten years ago he had so much money in the banks that farm loans were hard to obtain. The high prices of his crops naturally caused a big advance in land values. The result was that farmers with money bought out their neighbors with less money, who moved further West or to Canada to get cheaper lands. This in most cases means a new mortgage and so high a valuation on land that, if present crop prices don't continue, there is trouble ahead in that direction.

The net total result of all this complicated movement is that things are out of joint, and the time is about ripe for a readjustment, which is bound to come as sure as the sun rises and sets. We have been so busy for the last 15 years that we have never stopped to take an invoice of stock or a trial balance. One thing is certain: Both labor and capital must go back to the farm, even if a period of severe and prolonged depression is necessary, such as we had after the great trade booms preceding 1873 and 1893. Such a depression would of necessity drive capital and labor back to the farm, as both must be employed, if not at 100 per cent. profit, then at any profit to be had, as neither can remain idle long.

At no time in the history of this country has a bountiful crop made such a wonderful trade activity as this year's crop. In spite of a great national election, with many doubts as to the future business policy, we have rarely, if ever, had such a trade boom as the present, which makes us all work overtime to supply the demand. Is this a healthy condition, or does it show the need of a greater volume of farm products? What would have happened this year if the bountiful crops had not come to our rescue?

E. C. COLE.

CHICAGO, November 6, 1912.

"The Metallography of Iron and Steel"

To the Editor: Will you allow me to say a few words in regard to the kind review of my book, "The Metallography of Iron and Steel," published in your issue of October 10, 1912? The reviewer expresses his regret that lists of important original papers are not given at the end of each chapter. Although I fairly anticipated the criticism, the omission was intentional. As a matter of fact, for my first chapters I did prepare bibliographies of original articles pertaining to the subjects dealt with. I realized then, however, that to print lists at all exhaustive would confuse and discourage the student rather than assist and interest him, because of their great length. Certainly, to be of real value to the reader such bibliographies should include only the most important contributions or else, if exhaustive, attention should be called to those of greater merit. In other words, the wheat should be separated from the chaff. This, however, is so delicate and difficult a task in more ways than one and of such uncertain value that I hesitated to undertake it. No one writing a book on the metallurgy of iron and steel would think of printing a list of all the previous contributions to that art; and while, of course, the literature of the metallography of iron and steel is far from being as extensive, still it is now so voluminous that surely more than 2000 references would have to be given. It seemed better to me to use freely and to condense as intelligently as was in my power the information contained in that large number of original articles without referring the reader to them. But I may be wrong and if this can be made clear to me the biliographies of which your reviewer speaks will be appended to the different chapters in subsequent editions of my book.

I was rather surprised at the remarks that the book needed more careful editing in a few places, for I was under the impression that the editing had been done with very great care and that very few errors indeed had been left uncorrected, and I still think that it is freer from editorial errors than the majority of first editions of technical or other books.

ALBERT SAUVEUR.

CAMBRIDGE, MASS., October 31, 1912.

Republic Adding More Open Hearth Furnaces

The Republic Iron & Steel Company, Youngstown, Ohio, has started construction work on two more open hearth furnaces, which will give it a total of 10. The contract for the gas producers for these furnaces has been placed with the Wellman-Seaver-Morgan Company, Cleveland, Ohio, and five producers of the Hughes type will be installed. Work on the foundations for the four additional hot blast stoves for No. 1 blast furnace at Haselton is under way, and about half the 800 piles have been driven. The William B. Pollock Company, Youngstown, has the contract for all the steel plate work for these stoves.

The Reorganization Committee of the Southern Iron & Steel Company announces that John W. Platten has been elected chairman, to succeed Cecil A. Grenfell, and Alfred A. Cook has been added to the committee. The time for deposit of bonds, secured notes and debentures has been extended to November 30, in view of the probability of an early sale of the company's properties and because of the large amount of deposits already received. There have been deposited 89 per cent. of bonds, 88 per cent. of secured notes and 91 per cent. of debentures.

The Iron and Metal Markets

Sales Far Into Next Year

One Factor in the Steel Corporation's Unfilled Orders

Large Inquiries from Canada—Steel Making Pig Iron More Active

It was not expected that the October rate of production at steel works, which represented a strain for records all along the line, would be maintained in November. There has been the natural reaction from such speeding up, but the mills are still under heavy pressure for deliveries and are responding well.

The addition of more than a million tons in October to the Steel Corporation's total of unfilled orders was a surprise, in view of reports from various producers that new contract business has lately come in at a less rate than specifications. The steady inflow of export orders to the Steel Corporation is one explanation of these variant reports; another, and probably of greater weight, is that the Steel Corporation has been selling farther ahead at existing contract prices than most of its competitors, having taken considerable business, it is known, for delivery in the third quarter of 1913.

There are indications, apart from the large increase in its exports, that the Steel Corporation will contribute a larger percentage of the country's total steel production in 1912 than in several years. Last year its total was 54 per cent.; it is likely to be 57 or 58 per cent. for 1912.

Rail orders of the week amount to about 100,000 tons, including 25,000 tons for the Southern Railway which will be rolled at Ensley, Ala. The New Haven and subsidiary lines have practically closed for 65,000 tons. The B. & O. purchases recently reported were 50,000 tons. The Brooklyn Rapid Transit and the New York Railways Company have bought 5300 tons of girder rails, and 3000 tons of Mayari Bessemer rails have been sold in the Chicago district.

Car contracts closed in the past week, eliminating unverified reports, were for 6200 cars. Pending lists total 43,850.

The buying of a large Canadian car interest has been a feature of the week. It has practically closed in this country for 50,000 tons of billets, structural shapes, plates and bars and is negotiating for an equal amount of pig iron. Canadian car works will be kept busy on present orders until late in 1913.

Payment of advances of $2 to $5 a ton over contract prices, to secure early deliveries of plates, shapes and bars, is still a resort of certain buyers; but producers have done well, having in view prolonging the period of full demand, to keep these higher prices from pulling up the general market. The so-called premium transactions still stand out as exceptional and represent a comparatively small tonnage.

The merchant pipe trade is not as heavy as in the early fall, jobbing demand having been satisfied, but there is good line pipe business, 45 miles of 20-in. pipe being closed last week, while there is inquiry for 15 miles of 10-in. pipe for West Virginia.

Sheet mills have been crowded with specifications, the leading company having received a larger volume last week than in any week in its history. These, however, apply on orders placed at $4 or $5 a ton less than present prices. Tin plate contracts closed in the past six weeks have been very heavy and in some cases deliveries reach far into 1913. The business done at $3.50 a few weeks ago was exceptional, and $3.60 has been the basis of practically all forward contracts.

In cast iron pipe an advance of $1 a ton has been made by one interest recently, in view of further pig iron advances. Some export inquiry for cast iron pipe is indicated by the reported inquiry from the United States for 30,000 tons of gray forge iron at Middlesbrough, England. Even with the drawback on the $2.50 duty it is figured that domestic iron is cheaper, and at all events British iron cannot be had.

Reports from foundry pig iron markets agree that contrary to the usual procedure prices are advancing in the absence of any important business. Northern iron at Chicago has been marked up 50c. and in the Central Western Valleys prices are firmer.

Steel making pig iron has been more active. Pittsburgh reports 25,000 tons of Bessemer iron sold to a Youngstown steel company at $17, Valley furnace, first quarter delivery, and sales of 10,000 tons and 15,000 tons of basic, the former to a large steel company at Pittsburgh, at $16.25, Valley.

Stocks of pig iron at steel works and merchant furnaces in eastern Ohio and western Pennsylvania, excluding the Steel Corporation, were 466,000 tons on November 1, a decrease of 20,000 tons in October.

The attitude of coke producers is indicated by two quotations of $3.50 on 6000 tons of furnace coke a month for the first half of 1913. A large Eastern steel company has contracted for about 15,000 tons a month for the entire year 1913 at a price reported to be somewhat under $3.

The recent decline in the scrap market, in contrast with every new material market, has caused wide comment. The cause is found largely in the extensive scrapping of cars of late and the cumulative effect of scrap additions made by months of heavy operations in all iron and steel lines.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics.

At date, one week, one month and one year previous.

	Nov. 13, 1912.	Nov. 6, 1912.	Oct. 16, 1912.	Nov. 15, 1911.
Pig Iron, Per Gross Ton:				
Foundry No. 2 X, Philadelphia	$18.25	$18.25	$17.75	$15.00
Foundry No. 2, Valley furnace.	**17.00**	16.75	16.25	13.25
Foundry No. 2, Southern, Cincinnati	17.25	17.25	16.75	13.25
Foundry No. 2, Birmingham, Ala.	14.00	14.00	13.50	10.00
Foundry No. 2, furnace, Chicago*	17.50	17.50	17.00	14.00
Basic, delivered, eastern Pa.	18.00	18.00	17.50	14.50
Basic, Valley furnace	16.25	16.25	16.00	12.35
Bessemer, Pittsburgh	17.90	17.90	17.90	14.90
Malleable Bessemer, Chicago	**18.00**	17.50	17.00	14.35
Gray forge, Pittsburgh	16.40	16.40	16.40	16.40
Lake Superior charcoal, Chicago	**18.75**	18.25	18.75	16.50
Billets, etc., Per Gross Ton:				
Bessemer Billets, Pittsburgh	27.00	27.00	26.00	19.50
Open hearth billets, Pittsburgh	27.50	27.50	26.50	19.00
Forging billets, Pittsburgh	34.00	34.00	33.00	24.00
Open hearth billets, Philadelphia	**32.00**	30.00	30.00	21.40
Wire rods, Pittsburgh	**30.00**	29.00	28.50	25.00
Old Material, Per Gross Ton:				
Iron rails, Chicago	18.00	18.00	17.50	14.50
Iron rails, Philadelphia	**19.00**	18.00	17.50	15.50
Car wheels, Chicago	**17.00**	16.50	16.00	12.00
Car wheels, Philadelphia	15.00	15.00	15.00	11.25
Heavy steel scrap, Pittsburgh	*15.25*	15.50	16.00	12.00
Heavy steel scrap, Chicago	*13.50*	13.75	14.00	9.50
Heavy steel scrap, Philadelphia	15.50	15.50	15.50	11.50

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished **Iron and Steel,** Per Pound to Largest Buyers:	Nov. 13, 1912. Cents.	Nov. 6, 1912. Cents.	Oct. 16, 1912. Cents.	Nov. 15, 1911. Cents.
Bessemer rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.67½	1.67½	1.60	1.20
Iron bars, Pittsburgh	1.55	1.55	1.50	1.20
Iron bars, Chicago	**1.55**	1.50	1.50	1.15
Steel bars, Pittsburgh, future	1.40	1.40	1.40	1.10
Steel bars, Pittsburgh, prompt	1.60	1.60	1.40	1.10
Steel bars, New York, future	1.56	1.56	1.56	1.26
Steel bars, New York, prompt	1.76	1.76	1.56	1.26
Tank plates, Pittsburgh, future	1.45	1.45	1.45	1.15
Tank plates, Pittsburgh, prompt	1.60	1.60	1.45	1.15
Tank plates, New York, future	1.61	1.61	1.61	1.31
Tank plates, New York, prompt	1.76	1.76	1.61	1.31
Beams, Pittsburgh, future	1.45	1.45	1.45	1.15
Beams, Pittsburgh, prompt	**1.70**	1.55	1.45	1.15
Beams, New York, future	1.61	1.61	1.61	1.31
Beams, New York, prompt	**1.86**	1.71	1.61	1.31
Angles, Pittsburgh, future	1.45	1.45	1.45	1.15
Angles, Pittsburgh, prompt	**1.70**	1.61	1.45	1.15
Angles, New York, future	1.61	1.61	1.61	1.31
Angles, New York, prompt	**1.86**	1.71	1.61	1.31
Skelp, grooved steel, Pittsburgh	**1.45**	1.40	1.40	1.12½
Skelp, sheared steel, Pittsburgh	**1.50**	1.45	1.45	1.20
Steel hoops, Pittsburgh	1.50	1.50	1.45	1.30
Sheets, Nails and Wire, Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.25	2.25	2.25	1.85
Wire nails, Pittsburgh	1.70	1.70	1.70	1.55
Cut nails, f.o.b. Eastern mills	1.75	1.75	1.70	...
Cut nails, Pittsburgh	1.70	1.70	1.65	1.50
Fence wire, ann'l'd. 0 to 9, P'gh.	1.50	1.50	1.50	1.35
Barb wire, galv., Pittsburgh	2.10	2.10	2.10	1.85
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt shipment	$4.00	$4.00	$3.50	$1.55
Furnace coke, future delivery	**3.25**	3.00	2.60	1.65
Foundry coke, prompt shipment	4.25	4.25	3.75	1.90
Foundry coke, future delivery	3.75	3.75	3.00	2.10
Metals, Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	**17.75**	17.50	17.75	12.75
Electrolytic copper, New York	**17.55**	17.25	17.62½	12.62½
Spelter, St. Louis	*7.30*	7.35	7.40	6.45
Spelter, New York	*7.45*	7.50	7.55	6.60
Lead, St. Louis	*4.57½*	4.60	4.90	4.15
Lead, New York	*4.72½*	4.75	5.05	4.25
Tin, New York	*50.00*	50.15	49.87½	43.15
Antimony, Hallett, New York	9.75	9.75	9.50	7.65
Tin plate, 100-lb. box, Pittsburgh	$3.60	$3.60	$3.60	$3.40

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.45c. to 1.60c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ⅛ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft., down to the weight of 1-16 in., take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive fire box steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inc.	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inc.	.50
Cutting to lengths or diameters under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ¼ in. and over, and zees, 3 in. and over, 1.45c. to 1.60c. Other shapes and sizes are quoted as follows:

	Cents per lb.
I-beams over 15 in.	1.50 to 1.55
H-beams over 18 in.	1.50 to 1.55
Angles over 6 in.	1.50 to 1.55
Angles, 3 in. on one or both legs, less than ¼ in. thick, plus full extras, as per steel bar card, Sept. 1, 1909	1.50 to 1.55
Tees, 3 in. and up	1.50 to 1.55
Angles, channels and tees, under 3 in. plus full extras as per steel bar card, Sept. 1, 1909	1.50 to 1.55
Deck beams and bulb angles	1.75 to 1.80
Hand rail tees	2.20 to 2.30
Checkered, trough and corrugated floor plates	2.35 to 2.55

Extras for Cutting to Length.

	Cents per lb.
Under 3 ft., to 2 ft. inclusive	.25
Under 2 ft., to 1 ft. inclusive	.50
Under 1 ft.	11.55

No charge for cutting to lengths 3 ft. and over.

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.60
Nos. 9 and 10	1.65
Nos. 11 and 12	1.70
Nos. 13 and 14	1.75
Nos. 15 and 16	1.80

Box Annealed Sheets, Cold Rolled.

Nos. 10 and 11	1.90
Nos. 12	1.90
Nos. 13 and 14	1.95
Nos. 15 and 16	2.00
Nos. 17 to 21	2.05
Nos. 22 and 24	2.10
Nos. 25 and 26	2.15
No. 27	2.20
No. 28	2.25
No. 29	2.30
No. 30	2.40

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11	2.40
No. 12	2.50
Nos. 13 and 14	2.50
Nos. 15 and 16	2.65
Nos. 17 to 21	2.80
Nos. 22 and 24	2.95
Nos. 25 and 26	3.10
No. 27	3.25
No. 28	3.40
No. 29	3.55
No. 30	3.70

Effective April 18, 1912, the rates for painted and formed roofing sheets, per 100 lb., are based on the following extras for painting and forming over prices for corresponding gauges in black and galvanized sheets:

Corrugated Roofing Sheets by Weight.

Painting.	29	25 to 28	19 to 24	12 to 18
Regular or oiling	...	0.15	0.10	0.05
Graphite, regular	...	0.25	0.15	0.10
Forming.				
2, 2½, 3 and 5 in. corrugated	0.05	0.05	0.05	0.05
2 V-crimped, without sticks	0.05	0.05	0.05	...
⅝ to 1¼ in. corrugated	0.10	0.10	0.10	...
3 V-crimped, without sticks	0.10	0.10	0.10	...
Pressed standard seam, with cleats	...	0.15	0.15	...
Plain roll roofing, with or without cleats	0.15	0.15	0.15	...
Plain brick siding	...	0.20	...	...
3-15 in. crimped	0.20	0.20	0.20	...
Weatherboard siding	...	0.25	0.25	...
Beaded ceiling	...	0.25	0.25	...
Rock face brick and stone siding	...	0.25	0.25	...
Roll and cap roofing, with caps and cleats	0.25	0.25	...	...
Roofing valley, 12 in. and wider	...	0.25	0.25	...
Ridge roll and flashing (plain or corrugated)	...	0.65	0.65	0.65

Boiler Tubes.—Discounts on lap welded steel and standard charcoal iron boiler tubes to jobbers in carloads are as follows:

Steel.		*Standard Charcoal Iron.*	
1¼ to 2¼ in.	62	1½ in.	46
2½ in.	64½	1¾ to 2¼ in.	48
2¾ to 3¼ in.	69½	2½ in.	53
3½ to 4 in.	72	2¾ to 3¼ in.	55½
5 and 6 in.	64½	3½ to 5 in.	58
7 to 13 in.	62		

Locomotive and steamship special grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Wire Rods and Wire.—Bessemer, open hearth and chain rods, $30. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.50; galvanized, $1.90. Galvanized barb wire, to jobbers, $2.10; painted, $1.70. Wire nails to jobbers, $1.70.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.65	$1.70	$1.75	$1.80	$1.90	$2.00	$2.10	$2.20
Galvanized	2.05	2.10	2.15	2.20	2.30	2.40	2.80	2.90

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (card weight) in effect from September 10, 1912, one point greater being allowed on merchant weight; iron pipe (full weight), from October 21, 1912:

Butt Weld.

Steel. Inches.	Black.	Galv.	Iron. Inches.	Black.	Galv.
⅛, ¼ and ⅜	72	52	⅛ and ¼	67	48
½	76	66	⅜	66	47
¾ to 3	79	71	½	70	57
			¾ to 1½	73	62
			2 and 2½	73	62

Lap Weld.

2	76	68	1¼	57	46
2½ to 6	78	70	1½	68	57
7 to 12	76	66	2	69	59
13 to 15	53	..	2½ to 4	71	62
			4½ to 6	71	62
			7 to 12	69	56

Plugged and Reamed.

1 to 3, butt	77	69	1 to 1½, butt	71	60
2, lap	74	66	2, butt	72	61
2½ to 4, lap	76	68	1¼, lap	55	44
			1½, lap	66	55
			2, lap	67	57
			2½ to 4, lap	69	60

Butt Weld, extra strong, plain ends.

⅜, ¼ and ⅜	68	58	⅜	64	53
½	73	67	½	68	61
¾ to 1½	77	71	¾ to 1½	72	63
2 to 3	78	72	2 and 2½	73	64

Lap Weld, extra strong, plain ends.

2	74	66	1½	66	60
2½ to 4	76	68	2	67	59
4½ to 6	75	67	2½ to 4	71	62
7 to 8	68	58	4½ to 6	70	61
9 to 12	63	53	7 and 8	64	54
			9 to 12	59	48

Butt Weld, double extra strong, plain ends.

½	63	57	½	58	50
¾ to 1½	66	60	¾ to 1½	61	53
2 to 2½	68	62	2 to 2½	63	55

Lap Weld, double extra strong, plain ends.

2	64	58	2	56	50
2½ to 4	66	60	2½ to 4	61	55
4½ to 6	65	59	4½ to 6	60	54
7 to 8	58	48	7 to 8	53	43

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Pittsburgh

PITTSBURGH, PA., November 13, 1912.

The pressure against the steel mills for deliveries shows no abatement. Specifications are rolling in at an unprecedentedly heavy rate. New buying, however, has shown a falling off, due to the fact that consumers are pretty well covered. On nearly all lines of finished iron and steel the mills are getting further back in deliveries, and consumers are willing to pay premiums of $2 to $6 a ton to get reasonably prompt service. The larger steel interests state, however, that they are not taking advantage of these offers, refusing absolutely to accept them, but on the other hand are making as equitable a distribution of their output as they possibly can. The leading steel companies have very little finished or semi-finished material to sell for delivery prior to July 1, and several of the large tin plate companies have a good part of their product sold up for all of next year. The result of the election has not apparently affected the local situation in any way, and it seems to be as strong as ever. The mills will go into 1913 with many orders on their books that should have been shipped out this year.

Pig Iron.—Continued heavy purchases of both Bessemer and basic iron are giving added strength to the market, especially in basic, and predictions are made here that basic will be selling as high as Bessemer by January 1. The Jones & Laughlin Steel Company has bought 10,000 tons of standard chilled basic iron from a local dealer, deliveries commencing November and running through to February, at $16.25, Valley furnace, or $17.15 delivered at its South Side works. We also note a sale of 15,000 tons of basic at the same price for first quarter delivery, and 25,000 tons of standard Bessemer for first quarter bought by a Youngstown steel interest at $17, Valley furnace. Other negotiations involving fairly heavy tonnages of both Bessemer and basic iron are now on, which may be closed before the week is out. While large lots of Bessemer iron are being sold at $17, small lots ranging from 200 to 600 tons are being sold at $17.25 and $17.50. We quote standard Bessemer iron at $17 in large lots and $17.25 to $17.50 in lots under 1000 tons for remainder of this year and first quarter; basic, $16.25 for this year and first quarter; No. 2 foundry, $17 to $17.25; malleable Bessemer, $16.50 to $16.75; gray forge, $15.50 to $15.60, all at Valley furnace, the freight rate for delivery in the Pittsburgh district being 90c. a ton.

Billets and Sheet Bars.—The situation as regards the supply of Bessemer steel seems to be a little easier but basic is as tight as ever. An outside Bessemer steel plant has sold 6000 tons of 4 x 4-in. Bessemer billets for first quarter delivery at $25 at its works, equal to $26, Pittsburgh. This price, however, is about $1 a ton under what is being charged for Bessemer steel for delivery over the next two or three months. A local steel mill has been offered $28 at mill for a very heavy tonnage of open hearth sheet bars, but turned the business down as it could not make the deliveries wanted. Several small lots of open hearth billets have been sold at $27.50 to $28, maker's mill. For shipment at convenience of the mill we quote: Bessemer billets, $27; Bessemer sheet bars, $27.50; open-hearth billets, $27.50, and open-hearth sheet bars, $28, f.o.b. mill, Pittsburgh or Youngstown. Forging billets are $34 or higher and axle billets are about $32 to $33, Pittsburgh.

Ferroalloys.—A feature of the ferromanganese market is that the German product is now being taken by some consumers as freely as English, and they are apparently very glad to be able to get it. A local dealer reports a sale of two cars of German ferromanganese at $75, Baltimore, for prompt shipment. New York importers are still requiring that all inquiries for ferromanganese for delivery next year be submitted to them before any quotations are made. On the other hand, it is stated that one or two importers would sell at $67 for delivery in last half, but ask a higher price for first half shipment. Prices on ferrosilicon are very strong, and sales of four or five cars of 50 per cent., aggregating 100 to 125 tons, are reported at $75 delivered. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $75; over 100 tons to 600 tons, $74; over 600 tons, $73, Pittsburgh. We quote 10 per cent. at $24; 11 per cent., $25; 12 per cent., $26, f.o.b. cars at furnace, Jackson, Ohio, or Ashland, Ky. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over and 12½c. in lots up to 2000 lb.

Steel Rails.—Of the Baltimore & Ohio order, which is reported to be for 50,000 tons, from 20,000 to 25,000 tons will come to the Carnegie Steel Company, part to be Bessemer and part open hearth, the latter to be rolled at its Ohio works at Youngstown. Details of other large contracts for steel rails are being worked out. Railroads are commencing to specify deliveries for first half and are expected to place more contracts for rails later on for delivery in second half. There is a very active demand for light rails and the Carnegie Company is not accepting new orders for delivery before January or later. This company received in the past week new orders and specifications against contracts for about 3500 tons of light rails. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45-lb. sections, 1.25c.; 16 and 20-lb., 1.30c.; 12 and 14-lb., 1.35c., and 8 and 10-lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Wire Rods.—A scarcity of rods for prompt shipment has developed, and new inquiry is very active. A local maker reports a sale of 500 tons of rods, Bessemer or open hearth at its option, at $30 per gross ton at its works for delivery in first quarter. One leading maker is refusing to quote on new business, stating that it has no rods to spare for the open market. We quote Bessemer, open hearth and chain rods at $30, Pittsburgh.

Muck Bar.—An outside mill has sold 1000 tons of muck bar at $31 at its mill, equal to $32, Pittsburgh. The new demand is active and muck bar is scarce. We quote best grades made from all pig iron at $32 to $32.50, Pittsburgh.

Skelp.—We note sales of 1000 tons of grooved steel skelp in narrow sizes at 1.45c. and 3000 to 4000 tons of grooved iron skelp at about 1.75c., maker's mill. Prices on skelp are very strong, and it is scarce and hard to obtain. We quote grooved steel skelp at 1.45c. to 1.50c.; sheared steel skelp, 1.50c. to 1.55c.; grooved iron skelp, 1.75c. to 1.80c.; sheared iron skelp, 1.80c. to 1.85c., delivered at buyers' mills in the Pittsburgh district.

Plates.—The Cambria Steel Company has received a contract from the New York, Ontario & Western Railway for 500 steel hopper cars. The Erie Railroad has placed 500 steel underframe box cars with the Standard Steel Car Company and is said to have placed 500 with another builder. The Pacific Fruit Express has given an order for 200 refrigerator cars to the American Car & Foundry Company and the latter has also taken an order for 100 steel gondolas from the Maine Central and another for 100 all-steel passenger cars from the New York, New Haven & Hartford. The New York, Ontario & Western is in the market for 500 hopper cars, 400 flat cars, 300 box cars, 50 refrigerator and 50 stock cars. We quote ¼-in. and heavier tank plates at 1.45c. to 1.50c., Pittsburgh, for delivery in first and second quarter, but for shipment within two to four weeks from date of order at 1.60c. to 1.70c.

Structural Material.—The Riter-Conley Mfg. Company of this city has taken a 400-ft. extension to the machine shop of the General Electric Company at Erie, Pa., 1300 tons, and the American Bridge Company has taken a 16-story office building for the Healey Real Estate & Improvement Company, Atlanta, Ga., 3000 tons. Inquiry has fallen off. Local fabricators report they have not taken any further important work in the past week. Work in sight includes about 1500 tons for new machine shops of the General Electric Company at Erie, Pa., and 3000 to 3500 tons for a proposed Masonic Temple in this city. The project to build a new hotel to take the place of the Griswold in this city has gone over for the time being. The two local interests are not accepting new orders for structural shapes for delivery prior to second quarter, and it is stated that up to 2c. is being paid for beams and channels for prompt delivery from stock. We quote beams and channels up to 15 in. at 1.45c., for delivery at convenience of the mills, and this would probably be in second quarter of next year, while for reasonably prompt shipment small lots are being sold at 1.60c. to 1.80c., Pittsburgh.

Car Wheels.—The Carnegie Steel Company is reported to have the output of its Schoen steel wheel works sold up for the next four to six months. We quote 36-in. steel wheels for passenger service at $18.50 and 33-in. for freight service at $14.50 per wheel, f.o.b., Pittsburgh.

Iron and Steel Bars.—Two local makers of steel bars report that their specifications against contracts in October were the largest of any one month in their history by many thousand tons. Makers of both iron and steel bars have been badly oversold for some months, and will carry heavy tonnages into next year that should have been shipped this year. Deliveries on steel bars are back from eight to ten weeks and premiums of $2 to $4 a ton are freely paid for prompt shipment. The new demand, while heavy, is not so active as a month or two ago, as consumers are pretty well covered. We quote steel bars at 1.40c. to 1.45c. for delivery at convenience of the mills, which would be in first or second quarter of next year, while for delivery over the remainder of this year from 1.60c. to 1.75c. is being freely paid. We quote common iron bars at 1.55c. to 1.60c. at mill, premium of $2 to $3 still being paid for prompt shipments. Makers of steel bars quote $1 extra per ton for twisting bars, ¾-in. and larger, and $2 extra per ton for ½ to ⅝-in.

Sheets.—New orders continue heavy, and in spite of the lateness of the season one leading local mill reports that its specifications last week were the greatest in any week in its history. With the advent of cold weather, the demand for roofing sheets will fall off. All mills are still much behind in deliveries. They are being importuned by customers to accept additional business for first quarter and first half delivery, but the feeling exists that buyers are probably overestimating their actual requirements. The mills will carry over into next year a very large tonnage that should have been delivered this year. Premiums of $1 to $2 a ton are being paid for delivery within two or three weeks from date of order. Regular prices are quoted elsewhere.

Tin Plate.—The heavy buying of bright plate by meat packers and can makers has been pretty well closed, but there is still some tonnage to be placed. If all the material contracted for is taken out, the condition in the tin plate trade in the first half of 1913 will be very active. The demand for this year's shipment is quiet, as the season is about over. The American Sheet & Tin Plate Company is running at present to about 87 per cent. of its hot mill capacity, and the other makers are running practically full. We continue to quote at $3.60 per base box for 14 x 20 coke plates for delivery through first quarter and first half of next year.

Hoops and Bands.—The new demand is rather quiet, as consumers are pretty well covered. Prices are firm. We quote steel bands at 1.40c. to 1.45c., with extras as per the steel bar card, and hoops at 1.50c., Pittsburgh, for shipment through first quarter.

Bolts and Rivets.—While most consumers have covered their needs for a considerable period, the new demand continues fairly heavy. All the makers are filled up for the next two or three months, and have large contracts for delivery in first quarter. For reasonably prompt shipment button head structural rivets are quoted as high as $2.10 and boiler rivets as high as $2.20, these prices representing premiums of $2 a ton. We quote regular prices of button head structural rivets at $2 and cone head boiler rivets at $2.10 per 100 lb., base, in carloads, an advance of 25c. being charged for small lots. The new discounts on bolts are as follows, in lots of 300 lb. or over, delivered within a 20c. freight raidus of maker's works:

Coach and lag screws	80 and 10% off
Small carriage bolts, cut threads	75 and 7½% off
Small carriage bolts, rolled threads	75, 10 and 2½% off
Large carriage bolts	70 and 5% off
Small machine bolts, rolled threads	75, 10 and 7½% off
Small machine bolts, cut threads	75, 10 and 2½% off
Large machine bolts	70 and 10% off
Machine bolts with C.P.C. and T nuts, small	75 and 7½% off
Machine bolts with C.P.C. and T nuts, large	70 and 2½% off
Square hot pressed nuts, blanked and tapped	$5.80 off list
Hexagon nuts	$6.40 off list
C.P.C. and R. square nuts, tapped and blank	$5.80 off list
Hexagon nuts ¾ and larger	$6.70 off list
Hexagon nuts smaller than ⅝	$7.30 off list
C.P. plain square nuts	$5.30 off list
C.P. plain hexagon nuts	$5.60 off list
Semi-finished hexagon nuts ⅝ and larger	85 and 5% off
Semi-finished hexagon nuts smaller than ⅝	85, 10 and 5% off
Small rivets	80 and 5% off

Spelter.—The market is quiet, and prices have again declined. We quote prime grades of Western at 7.25c. East St. Louis, equal to 7.37½c., Pittsburgh.

Railroad Spikes.—The Baltimore & Ohio Railroad has given an order for 40,000 kegs to a local mill for forward delivery and the Big Four has specified for 5000 kegs. There is still a great scarcity in small railroad and boat spikes, one local maker stating that it is five months behind in deliveries. Prices are higher, and we now quote railroad spikes in base sizes, 5½ x 9/16 in., at $1.90, and small railroad and boat spikes at $1.90 to $2 per 100 lb., f.o.b. Pittsburgh, for delivery through first quarter. Several makers state that jobbers are offering as high as $2 for small railroad and boat spikes, but makers are refusing to accept these offers, keeping their output of such spikes for their own trade.

Wire Products.—The new demand for wire nails is active, and specifications against contracts are coming in freely, but on plain wire the demand has quieted down Local makers of wire and wire nails report that they have their output pretty well sold over the remainder of this year, and have some orders for delivery in January and February. Two and possibly three of the leading makers are holding wire nails at $1.75 in most cases, but state that they are not booking very many new orders at this price, as other makers are still naming $1.70. Premiums of 5c. to 10c. per keg are still reported as being paid for prompt shipment. We quote wire nails at $1.70 to $1.75 per keg; cut nails, $1.70 per keg; galvanized barb wire, $2.10 per 100 lb.; painted, $1.70; annealed fence wire, $1.50, and galvanized fence wire, $1.90, f.o.b. Pittsburgh, usual terms, freight added to point of shipment. Jobbers charge the usual advances for small lots from store.

Merchant Steel.—Mills report that the new demand has quieted down to some extent, as consumers have pretty well covered their needs. Specifications against contracts are active and shipments are heavy. Prices continue firm, and we quote: Iron finished tire, 1½ x ⅜-in. and larger, 1.40c. base; under 1½ x ⅜-in., 1.55c.; planished tire, 1.60c.; channel tire, ¾, ⅞ and 1 in., 1.90c.; 1⅛ in. and larger, 1.80c.; toe calk, 2c. base; flat sleigh shoe, 1.50c.; concave and convex, 1.80c.; cutter shoes, tapered or bent, 2.40c. to 2.45c.; spring steel, 2c.; machinery steel, smooth finish, 1.80c. to 1.85c.

Shafting.—The new demand is only fairly active, as leading consumers have covered for some time

ahead. All makers of shafting are more or less behind in shipments. It is stated that regular discounts are being better observed than for a long time. We quote cold rolled shafting at 60 per cent. off in carload and larger lots and 55 per cent. in small lots delivered in base territory.

Merchant Pipe.—Reports current in the trade this week of an advance in prices of steel pipe are officially denied. The National Tube Company has taken a contract for 25 miles of 20-in. steel pipe and Spang, Chalfant & Co., Inc., for 20 miles of the same size for the Reserve Gas Company of Ohio. An inquiry is out for 15 miles of 10-in. steel pipe for delivery in West Virginia. The general demand for merchant pipe continues heavy, but is not so large as two or three weeks ago, jobbers evidently being pretty well covered. All the mills are back in deliveries from four to eight weeks, and two state that they had sold more pipe up to November 1 than in all of last year. Discounts on both iron and steel pipe are reported as being well maintained.

Boiler Tubes.—The new demand has quieted down a good deal, consumers having covered ahead for a considerable period. The output of both railroad and merchant tubes this year will be much the heaviest in any one year in the history of the trade. The demand for seamless steel tubing has been particularly heavy, one maker stating that its sales this year were fully 30 per cent. larger than last year. Discounts are reported as being well maintained.

Iron and Steel Scrap.—The heavy consumers are congested with material at present and are out of the market. The railroads are insisting that scrap loaded on cars be moved promptly, and for this reason it is being offered in some cases at rather low prices. The embargo on scrap routed for the Carbon Steel Company in this city has been raised, but an embargo is expected to be placed any minute at the works of a leading consumer, and this will probably have the effect of throwing a good deal of scrap on the market, destined for this particular plant. While dealers usually quote $15.50 on heavy steel scrap, consumers are not disposed to pay this price. A very heavy tonnage of bundled sheet scrap is being offered. The railroads are also putting out very heavy quantities of scrap. We note sales of 1000 tons of low phosphorus melting stock at $18.25; 3000 tons of heavy steel scrap at $15.25 to $15.50; 500 tons of cast iron borings at $10.15 and 300 tons of sheet bar crop ends at about $16.50, delivered. We have lowered quotations on nearly all grades, and the general market seems weak. Dealers now quote, per gross ton, as follows:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	$15.25 to $15.50
No. 1 foundry cast	15.00 to 15.25
No. 2 foundry cast	13.75 to 14.00
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	13.00 to 13.25
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 16.75
No. 1 railroad malleable stock	14.50 to 14.75
Grate bars	11.00 to 11.25
Low phosphorus melting stock	18.25 to 18.50
Iron car axles	24.50 to 25.00
Steel car axles	18.00 to 18.25
Locomotive axles, steel	22.00 to 22.25
Locomotive axles, iron	28.00 to 28.25
No. 1 busheling scrap	14.50 to 14.75
No. 2 busheling scrap	10.00 to 10.25
Old car wheels	16.00 to 16.25
*Cast-iron borings	10.15 to 10.25
*Machine shop turnings	10.75 to 11.00
†Sheet bar crop ends	16.75 to 17.00
Old iron rails	16.50 to 16.75
No. 1 R. R. wrought scrap	15.25 to 15.50
Heavy steel axle turnings	13.00 to 13.25
Stove plate	11.00 to 11.25

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Coke.—A local dealer has sold 15,000 tons of furnace coke per month for all of 1913 to one of the leading blast furnace and steel interests. The price has not been given out. On a recent inquiry for 6000 tons per month for first half, two local coke makers quoted $3.50 per net ton at oven, but the offers were declined. A leading steel company is in the market for a considerable tonnage up to January delivery and will probably close this week. Negotiations are still on for a large tonnage of furnace coke for next year, but little progress is being made. Prompt furnace coke is ruling firm at $4 to $4.15, and we note sales of 800 tons to one consumer at $4 and other sales aggregating 12,000 to 15,000 tons at prices ranging from $3.90 to $4.15 at oven. There is a fairly active inquiry for foundry coke, which is very firm. We quote furnace coke for prompt shipment at $4 to $4.15 per net ton at oven, and on contracts for first half of next year at $3.25 to $3.50, but so far most furnaces are refusing to pay above $3, and claim that even that figure is too high. We quote standard makes of 72-hr. foundry coke for prompt shipment at $4 to $4.25, while on contracts from $3.50 to $4 are being quoted. The output of coke in the Upper and Lower Connellsville regions last week was 399,805 net tons, an increase of about 1400 tons over the previous week.

Chicago

CHICAGO, ILL., November 12, 1912.

Increasing strength characterizes the local market. Northern pig iron has advanced about 50c. a ton. Railroad buying continues to be the striking feature of the finished material situation. Inquiries for railroad equipment, rails and track supplies are in such large volume as to indicate that there is still considerable buying yet to be done. Large rail tonnages have gone begging because of the inability of rolling mills to promise satisfactory deliveries. The higher prices of pig iron have forced an advance of $1 a ton on cast iron pipe. Scrap iron is still weak, showing declines from a week ago, and there is a difference of opinion as to whether the bottom has yet been reached.

Pig Iron.—Higher prices for Northern pig iron are now asked by local furnaces. Quotations of $17.50, Chicago, for Northern No. 2 foundry have been withdrawn, and in their place one interest is quoting $18, while another which has not a great deal of available tonnage for the remainder of the year has announced its price as $18.25. Lake Superior charcoal iron has also been advanced 50c., making the No. 1 grade $18.75. It is stated that quite a number of orders have been placed at the new prices. Southern iron can still be done at $14, Birmingham, for No. 2 foundry, for the remainder of this year, though some spot shipments have been made at $14.25 and $14.50. A number of sales of Southern iron running over 3 per cent. silicon at $15, Birmingham, for spot shipment have been reported. For first half delivery $14.50, Birmingham, is the ruling price, and no sales have been reported at any higher figure. The coke situation is still a very serious problem for melters. Inquiries for pig iron have not been of large size, ranging mostly from 100 to 500 tons. They have also been few. The Northwestern Iron Company will this week start another Mayville furnace and the second Federal furnace will be ready within 10 days. We quote local irons, f.o.b. furnace, the average switching charge to Chicago foundries being about 50c. a ton. Other quotations are for Chicago delivery. Prices on prompt shipment are as follows:

Lake Superior charcoal, Nos. 1, 2, 3, 4	$18.75 to $19.75
Northern coke foundry, No. 1	18.50
Northern coke foundry, No. 2	17.50 to 18.25
Northern coke foundry, No. 3	17.00 to 17.50
Northern Scotch, No. 1	19.00
Southern coke, No. 1 foundry and No. 1 soft	18.85 to 19.35
Southern coke, No. 2 foundry and No. 2 soft	18.35 to 18.85
Southern coke, No. 3	17.85 to 18.35
Southern coke, No. 4	17.35 to 17.85
Southern gray forge	16.85
Southern mottled	16.85
Malleable Bessemer	18.00
Standard Bessemer	19.40
Basic	17.50
Jackson Co. and Kentucky silvery, 6 per cent.	20.40
Jackson Co. and Kentucky silvery, 8 per cent.	21.40
Jackson Co. and Kentucky silvery, 10 per cent.	22.40

Rails and Track Supplies.—Large tonnages of rails will still be required by railroads. Inquiries are numerous, but great difficulty is being experienced by railroad companies in getting desirable deliveries. In most instances roads want rails for spring construction, but mills are so badly sold up that considerable good business cannot be figured upon by the larger interests. The demand for spikes and track bolts is exceptionally large, and shipping instructions are for earliest possible delivery. We quote standard railroad spikes at 1.95c. to 2.05c., base; track bolts with square nuts, 2.30c. to 2.40c., base, all in carload lots, Chicago; tie plates, $32 to $34.50 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—New business placed subsequent to the election was of large volume, and specifications on former contracts continued at a rate in excess of production. Railroad buying is still a very important feature of the market. The Pacific Fruit Express is reported to have ordered 2000 cars; the San Antonio & Aransas Pass Railroad 1000 box cars, and the Northern Pacific 4500 assorted cars. The Chicago,

Rock Island & Pacific is inquiring for nearly 2000 cars. The largest contract for building structural material of the past week was awarded to the American Bridge Company by the Great Northern, amounting to 3719 tons, for an ore dock at Allouez Bay, Wis. The American Bridge Company was also awarded 285 tons for a steel frame building to be erected by George W. Fisher at Seattle, Wash., and 170 tons for galvanized bracket arms for overhead trolley wires by the Southern Pacific, to be used in California. The Omaha Structural Company took 362 tons for a new hotel at Hastings, Neb. We quote for Chicago delivery, mill shipment, plain shapes, 1.63c. to 1.83c.

The demand for structural shapes out of store shows no signs of lessening. We quote for base sizes, 2.05c.

Plates.—Locomotive building is requiring a large tonnage of plates. New business in locomotives includes an order for 29 six-wheel switching engines by the Chicago & Northwestern; five of the same type for the Chicago & Burlington, 85 of various types by the Chicago, Rock Island & Pacific. Prompt deliveries of plates continue to command a premium. We quote for Chicago delivery, mill shipment, 1.63c. to 1.83c.

Plates are in such demand from jobbers that difficulty is experienced in keeping complete assorted stocks on hand. We quote for base sizes, 2.05c.

Sheets.—A mill which is a large factor in this market has frequently declined to quote prices on very desirable business when shipment was specified prior to January 1 or thereabouts. Other mills are in precisely the same situation with regard to deliveries for the next six or eight weeks. Prices are very firm. We quote for Chicago delivery, in carloads from mill; No. 28 black sheets, 2.53c.; No. 28 galvanized, 3.68c., and No. 10 blue annealed, 1.83c. to 1.88c.

With the mills unable to make deliveries during the remainder of this year on orders placed now, the position of jobbers is especially strong. Demand upon them continues to be heavy. We quote on sheets out of store as follows: No. 10 blue annealed, 2.25c.; No. 28 black, 2.80c., and No. 28 galvanized, 4.05c.

Bars.—Bar iron is stronger. Quotations at 1.50c., Chicago, have practically disappeared and 1.55c. is more nearly the minimum price at which it can be purchased for delivery at convenience of shipper, while for more favorable delivery 1.60c. is obtainable. For steel bars specifications are coming in freely, no let-up having occurred as a result of the election. On new business mills are unable to promise deliveries until after the first of the year. Though 1.40c., Pittsburgh, nominally represents the market, it is almost impossible to procure steel bars at this price, as mills are accepting very little, if any, business for the remainder of 1912, and on 1913 business fully 1.45c. is asked. We quote for mill shipment as follows: Bar iron, 1.55c. to 1.60c.; soft steel bars, 1.58c. to 1.65c.; hard steel bars, 1.60c. to 1.70c.; shafting in carloads, 60 per cent. off; less than carloads, 55 per cent. off.

Jobbers are still enjoying a big demand for steel bars and bar iron. The demand for reinforcing bars has dropped off somewhat. For delivery from store, we quote soft steel bars, 1.95c.; bar iron, 1.95c.; reinforcing bars, 1.95c. base with 5c. extra for twisting in sizes ¾ in. and over, and 7½c. extra for smaller sizes; shafting 55 per cent. off.

Rivets and Bolts.—The minimum quotation for structural rivets is now 2.18c. in this market. We quote from mill as follows: Carriage bolts up to ⅜ in. x 6 in., rolled thread, 75-10-2½; cut thread, 75-7½; larger sizes, 70-5; machine bolts up to ⅜ in. x 4 in., rolled thread, 75-10-7½; cut thread, 75-10-2½; large sizes, 70-10; coach screws, 80-10; hot pressed nuts, square head, $5.80 off per cwt.; hexagon, $6.40 off per cwt. Structural rivets, ¾ to 1¼ in., 2.08c. to 2.18c.; base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ⅜ x 4 in., 70-12½; larger sizes, 65-10; carriage bolts up to ⅜ x 6 in., 70-10; larger sizes, 65-5 off. Hot pressed nuts, square head, $5.40, and hexagon, $6 off per cwt.

Wire Products.—Wire nails, barb wire and fence wire are in strong demand, new business and specifications showing no curtailment. The minimum price for wire nails and painted barb wire continues at $1.70, Pittsburgh. We quote plain wire, No. 9 and coarser, base, $1.68 to $1.73; wire nails, $1.88 to $1.93; painted barb wire, $1.88 to $1.93; galvanized, $2.28 to $2.33; polished staples, $1.88 to $1.93; galvanized, $2.28 to $2.33, all Chicago.

Cast Iron Pipe.—An advance of $1 a ton has been made by the leading interest, owing to the high prices of pig iron. A fair business is being done. We now quote as follows, per net ton, Chicago: Water pipe, 4 in., $31; 6 to 12 in., $29; 16 in. and up, $28, with $1 extra for gas pipe.

Old Materials.—The weakness in the scrap iron market is still quite pronounced. Prices have declined from 25c. to 50c. a ton since a week ago. Very little buying and selling are being done. Shipments of old materials from country sources have decreased. Since prices started downward three weeks ago there has been a decline approximating $1 to $1.25 a ton on almost every item. Railroads have an enormous quantity of scrap on hand, but are unable to load owing to lack of equipment and scarcity of labor. A Wabash Railroad list of a few hundred tons was closed Monday. The Michigan Central has issued a list amounting to 1800 tons, which closes November 14, and the Baltimore & Ohio Chicago Terminal lines have offered 200 tons, which closes this week. We quote for delivery at buyer's works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	$18.00 to $18.50
Old steel rails, rerolling	16.25 to 16.75
Old steel rails, less than 3 ft	14.50 to 15.00
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	16.75 to 17.00
Heavy melting steel scrap	13.50 to 14.00
Frogs, switches and guards, cut apart	13.50 to 14.00
Shoveling steel	13.00 to 13.50
Steel axle turnings	11.00 to 11.50

Per Net Ton.

Iron angles and splice bars	$16.00 to $16.50
Iron arch bars and transoms	17.00 to 17.50
Steel angle bars	12.75 to 13.25
Iron car axles	21.50 to 22.00
Steel car axles	17.75 to 18.25
No. 1 railroad wrought	13.25 to 13.75
No. 2 railroad wrought	12.25 to 12.75
Cut forge	12.25 to 12.75
Steel knuckles and couplers	12.50 to 13.00
Steel springs	13.25 to 13.75
Locomotive tires, smooth	14.00 to 14.50
Machine shop turnings	8.25 to 8.75
Cast and mixed borings	7.25 to 8.00
No. 1 busheling	11.50 to 12.00
No. 2 busheling	8.50 to 9.00
No. 1 boilers, cut to sheets and rings	9.50 to 10.00
Boiler punchings	12.50 to 13.00
No. 1 cast scrap	13.25 to 13.75
Stove plate and light cast scrap	11.00 to 11.50
Railroad malleable	13.50 to 14.00
Agricultural malleable	11.50 to 12.00
Pipes and flues	10.50 to 11.00

The J. L. Rubin Iron Company, Chicago, has succeeded the Rockford Iron & Steel Company, Rockford, Ill. J. L. Rubin, formerly secretary and treasurer of the Rockford Company, will take full charge, maintaining offices in Chicago.

Philadelphia

PHILADELPHIA, PA., November 12, 1912.

The effect of the election on trade conditions has been unimportant. In some branches orders have been more numerous. The strength of the market appears to be maintained in all directions. Moderate sales of pig iron are noted at full prices. Further orders for rails and cars have been placed by railroads. The purchase is reported of 65,000 tons of rails by the New York, New Haven & Hartford Railroad, which will be divided among the Pennsylvania, Bethlehem and Lackawanna steel companies. The Pennsylvania Steel Company also reports orders for 5000 tons from the Seaboard and 4000 tons from the Southern Railway, with 3300 tons from smaller buyers. Upward of 90,000 tons of rails are now being figured on by this producer. Steel billets continue in active demand. Coke has been a shade more active, and one contract for 150,000 to 200,000 tons of furnace coke for 1913 delivery has been closed. The old material market while quiet continues comparatively strong.

Iron Ore.—No further movement in foreign ores is reported in this district, the principal sellers having already disposed of all the ore available for 1913 shipment. Importations during the week include 17,700 tons of Canadian, 2500 tons Venezuelan and 13,850 tons Cuban.

Pig Iron.—Buying has been on a very fair basis, and the strength of the market is fully maintained. The position of sellers in this district is decidedly strong, an extremely favorable situation having been shown by the statistics for October at the meeting of the Eastern Pig Iron Association last week. Stocks showed a further decrease and now represent but a few days' supply at the present producing rate. A sharp increase in unfilled orders was prevented by the refusal of many of the producers to load up at recent prices. Virginia statis-

tics show an increase in unfilled orders and a further sharp decrease in stocks. Practically no iron is on furnace banks outside that of the leading producer, which has unfilled orders on its books considerably in excess of the amount on hand. Insufficient coke and labor supply still restricts the blowing in of idle furnaces. Inquiries are in hand for numerous moderate lots of foundry grades and a few sizable quantities for next year's delivery. Sellers maintain prices firmly, some being pretty well sold up for the remainder of the year. Small sales of standard brands of eastern Pennsylvania No. 2 X foundry have been made at both $18.25 and $18.50, delivered, and in instances somewhat better prices are obtained. At the same time $18.25 has been slightly shaded for less well-known brands. Virginia foundry iron has been selling in small lots at $16, furnace, for No. 2 X, and in instances slightly better prices are obtained for prompt deliveries. Cast iron pipe makers in this district have been in the market for varying quantities of low grade iron. One has taken several thousand tons, while another has an inquiry out for 5000 tons for January-February shipment. Small lot sales of off grade iron have been made at prices ranging from $17.25 to $17.75, delivered, according to analysis. Sales of an aggregate of some 3000 tons of rolling mill forge iron have been made to consumers in the central part of the state at prices close around $17.50 to $17.75, delivered. Small sales in this district are reported, as high as $17.90, delivered, having been paid. Transactions in steel making grades have been rather quiet, an inquiry for 3500 tons of basic iron from a Harrisburg consumer being still unclosed. This grade appears to be no longer available at $18, delivered, makers asking $18.25 minimum, although that basis has not yet been established. No further demand for low phosphorus pig iron is reported, the principal consumers now being pretty well covered as to near future needs. The following range of prices about represents the market for standard brands, delivered in buyers' yards in this district during the remainder of this year and early portion of 1913:

Eastern Pennsylvania No. 2 X foundry	$18.25 to $18.50
Eastern Pennsylvania No. 2 plain	18.00 to 18.25
Virginia No. 2 X foundry	18.80 to 19.00
Virginia No. 2 plain	18.55 to 18.75
Gray forge	17.50 to 17.75
Basic	18.00 to 18.50
Standard low phosphorus	23.50 to 24.00

Ferroalloys.—Not much business has developed in this market, but sellers report Western inquiries for both ferromanganese and ferrosilicon, with some small sales. Eighty per cent. ferromanganese is strong at $61, seaboard, for last half of next year, while $62.50 has been done for first half. Up to $75 is named for prompt shipment. Fifty per cent. ferrosilicon is firm at $73 to $75, delivered, according to quantity. Furnace ferrosilicon has advanced and is now quoted at $27.30 for 10 per cent.; $28.30 for 11 per cent. and $29.30 for 12 per cent., delivered in this vicinity.

Billets.—While makers are in daily receipt of inquiries for both rolling and forging billets for prompt as well as future delivery, they are giving such correspondence scant attention as they are so well sold up for the remainder of this year and the first quarter of next. A transaction covering 10,000 tons of rolling billets, made several weeks ago, at the then prevailing prices, has just become definitely known. Standard billets for prompt shipment bring comparatively fancy prices. For ordinary delivery orders for basic open-hearth rolling billets have been taken at $32, delivered, while forging billets range from $34, mill, upward, depending on specifications and delivery.

Plates.—The pressure of business coming to Eastern plate mills has not diminished. A limited amount for early delivery—eight or ten weeks—can be taken, as unfilled orders are steadily piling up. The makers refuse to enter large orders for extended shipment. While some name 1.60c., delivered here, for uncertain future delivery, the bulk of the orders entered by Eastern makers have been on the basis of 1.75c. to 1.78c., delivered, for sheared and 1.80c. to 1.83c. for universal plates, shipment in instances extending into the first quarter of next year.

Structural Material.—There is a fair demand for miscellaneous plain shapes for various purposes. Material for car construction work is in good demand, but little new business in large fabricated structural material for building work has developed in this immediate vicinity. Eastern mills are comparatively well fixed as far as orders and specifications are concerned, and, for the most part, are unable to enter orders, except in odd lots, for early delivery. Plain structural shapes for uncertain shipment are quoted at 1.60c., delivered; for reasonable shipment 1.75c., delivered, is generally quoted.

Sheets.—An active demand is reported, with premiums of several dollars a ton offered for prompt deliveries. Shipments from Eastern mills have, however, been further delayed by temporary idleness at some plants owing to labor difficulties, which have, however, been adjusted. Current orders are heavy and specifications against contracts are being freely made. Western sheets are quoted at 1.80c. for blue annealed, although Eastern mills making smooth, loose-rolled sheets readily obtain an advance of ¼c. to ½c. per lb. over the Western basis.

Bars.—A very fair volume of business is moving in both steel and iron bars. Mills are well supplied with business and not seeking orders aggressively. Common iron bars for ordinary delivery are available at 1.67½c., delivered here, although for prompt shipment as high as 1.75c., mill, or 1.82½c., delivered, has been paid. Steel bars for unspecified delivery are quoted at 1.55c., although for prompt shipment they have been sold in moderate lots at 1.85c., delivered here.

Coke.—The principal transaction during the week was a sale of 150,000 to 200,000 tons of furnace coke, representing the product of the Hastings and Lost Creek ovens of the Pennsylvania Coal & Coke Corporation during 1913 to the Bethlehem Steel Company. The price has not been announced, but is reported to be close to $3 at ovens. Further odd lot sales of prompt furnace coke to consumers in this district at prices ranging from $3.75 to $4 are reported. Foundry coke for early delivery is in active demand and sellers have realized higher prices on small transactions. For prompt shipment $4.25 to $4.50, at oven, has been obtained, although contract foundry coke is still quoted around $3.75 to $4. The following quotations, per net ton, about represent the market for deliveries in buyers' yards in this vicinity

Connellsville furnace coke	$5.00 to $6.25
Connellsville foundry coke	6.00 to 6.60
Mountain furnace coke	4.50 to 5.85
Mountain foundry coke	5.60 to 6.10

Old Material.—Notwithstanding efforts of some consumers to force lower prices, the market has remained steady and in some special grades of material, which are comparatively scarce, higher prices have been realized. Consumers of heavy melting steel, while not actively in the market, continue to pay in instances $15.50, delivered, for No. 1 stock. Some grades of rolling mill material are higher; borings particularly have been scarce and better prices realized. Dealers who have any quantity of material on hand show little disposition to sell, and the bulk of the trading has been in small odd lots. Prices are comparatively firm, the following range about representing the market for deliveries in buyers' yards, eastern Pennsylvania and nearby points, taking a freight rate ranging from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel scrap and crops	$15.50 to $16.00
Old steel rails, rerolling (nominal)	17.00 to 17.50
Low phosphorus heavy melting steel scrap	19.25 to 19.75
Old steel axles	20.00 to 20.50
Old iron axles	26.00 to 27.00
Old iron rails	19.00 to 20.00
Old car wheels	15.00 to 15.50
No. 1 railroad wrought	17.25 to 17.75
Wrought iron pipe	14.00 to 14.50
No. 1 forge fire	13.50 to 14.00
No. 2 light iron (nominal)	8.00 to 8.50
Wrought turnings	11.50 to 12.00
Cast borings	11.50 to 11.75
Machinery cast	14.75 to 15.25
Grate bars, railroad	11.50 to 12.00
Stove plate	11.50 to 12.00
Railroad malleable (nominal)	13.50 to 14.00

Allen R. Hoffer, formerly connected with the U. S. Metal & Mfg. Company, Philadelphia, has opened an office at 1205 Pennsylvania Building, in this city, under the name of Allen R. Hoffer & Co., for the purpose of dealing in iron and steel scrap, and will also act as general agent in this district for Suisman & Blumenthal, Hartford, Conn.

Cleveland

CLEVELAND, OHIO, November 12, 1912.

Iron Ore.—Reservations of considerable additional tonnage for 1913 delivery have been made in the past few days, and it appears that the bulk of the Bessemer grades have been reserved. In some cases the transactions have been in the form of sales at whatever later becomes established as the market price. A moderate amount of non-Bessemer ore, mostly the better grades, has also been reserved. Sellers have under considera-

tion the matter of prices, but as far as can be ascertained no definite prices have been named as yet. Some of the ore firms will take the matter up with their mining companies before reaching a decision, but there is a possibility that any day some firm will sell a round tonnage at a stated price and thus make a market. Some sellers seem inclined to be satisfied with an advance of 50c. a ton on all grades. Others think the market should go back to the 1911 prices, which means an advance of 75c. a ton on Bessemer and 65c. on non-Bessemer grades. Weather conditions so far this month have favored shippers, and the movement in the first half of the month will not show much falling off from October. A large amount of ore was placed on docks last month and stocks at Lake Erie ports are heavier than they were a year ago. On November 1 these stocks were 9,608,271 tons. On the same date a year ago there were 8,984,371 tons on the docks. Receipts at Lake Erie docks up to November 1 were 33,407,923 tons, or nearly 11,000,000 tons ahead of the same period in 1911. Shipments to the furnaces up to November 1 were 22,358,235 tons, as compared with 15,649,447 tons for the same period in 1911. We quote prices for this season as follows: Old range Bessemer, $3.75; Mesaba Bessemer, $3.50; old range non-Bessemer, $3.05; Mesaba non-Bessemer, $2.85.

Pig Iron.—The market is quiet on all grades. Prices are firm and unchanged. Some small sales of foundry grades are reported for next year's delivery, but these are mostly in lots of around 100 tons. There is also some demand for small lots for prompt shipment from foundries that need additional iron for this year's delivery. Furnaces are having trouble in making shipments as promptly as desired because of car shortage. The consumption continues heavy and furnaces generally are shipping out more iron than they are making, having reduced stocks considerably during the past 30 days. For prompt shipment and for the first half of 1913 we quote, delivered Cleveland, as follows:

Bessemer	$17.90 to $18.15
Basic	17.15 to 17.25
Northern No. 2 foundry	17.25 to 17.50
Southern No. 2 foundry	18.35 to 18.60
Gray forge	16.75 to 17.00
Jackson County silvery, 8 per cent. silicon	20.05 to 21.55

Coke.—The market continues very firm but quiet. Some foundry coke has been sold at $4 for the first half and some producers are asking as high as $4.50 for that delivery. For spot shipment 72-hr. foundry coke is quoted at $4.25 to $4.65 per net ton, at oven. The deadlock over furnace coke continues. Producers generally quote furnace coke at $3.25 to $3.50 for the first half and $3.85 to $4 for prompt shipment.

Finished Iron and Steel.—Considerable new inquiry is coming out both for contracts and for material for specific work, but as a rule the mills are not in position to take on additional tonnage. Some buyers are prepared to furnish specifications for material which they want for extended future delivery. Specifications continue fairly heavy, although some buyers have specified the full amount of their contracts for delivery up to next July. There is a moderate demand for small lots for prompt shipment, which buyers in most cases have to take from warehouses at stock prices. While there has been no advance in warehouse prices, jobbers in some cases have to secure material from mills at premium prices to fill warehouse orders, necessitating an advance over regular stock prices. Steel bars are quoted at 1.40c. to 1.45c., Pittsburgh, for future delivery, and structural material and plates at 1.45c. to 1.50c. Eastern mills have advanced prices on plates and shapes for Western shipment, quoting plates at 1.60c. to 1.70c. and structural material at 1.65c. As they are now unable to make the deliveries within 60 days or longer, which is too extended for buyers who want material for early delivery, they are not taking much to business in this market. Structural steel consumers are anxious to place contracts for extended future delivery, but new inquiry for specific work is light. The Hocking Valley Railroad received bids November 11 for new docks to be built in Toledo, Ohio. These will require 700 tons of steel piling and considerable tonnage of reinforcing bars. Hard steel bars are quoted at 1.40c. for contract and 1.50c. to 1.60c. for prompt shipment. Iron bars are firm at 1.55c. to 1.60c., Cleveland mill. The sheet market is very firm and mills are well filled up. Some mills are making sales of 2.35c. for No. 28 black and 3.50c. for No. 28 galvanized, or an advance of $2 a ton over regular prices. Warehouse prices are 1.95c. for steel bars and 2.15c. for shapes and plates.

Old Material.—The market is very quiet and weak. The price of heavy melting steel has declined 50c. a ton and prices on other grades are from 25c. to 50c. a ton lower than a week ago. Mills are well stocked as a result of heavy buying and dealers do not look for much demand in the next few weeks. Considerable tonnage has been offered at the reduced prices, but these do not appear attractive to consumers who generally have all the scrap they will need for the remainder of the year. On the other hand, some sellers think that the market will pick up shortly and are not offering much material at a concession. Some of our quotations are nominal because of the absence of transactions since the market has developed weakness. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton.

Old steel rails, rerolling	$15.00 to $15.50
Old iron rails	17.50 to 18.00
Steel car axles	18.75 to 19.25
Heavy melting steel	14.25 to 14.50
Old car wheels	13.50 to 14.00
Relaying rails, 50 lb. and over	23.00 to 23.50
Agricultural malleable	12.50 to 13.00
Railroad malleable	14.00 to 14.50
Light bundled sheet scrap	12.50 to 13.00

Per Net Ton.

Iron car axles	$21.00 to $22.00
Cast borings	8.25 to 8.50
Iron and steel turnings and drillings	9.00 to 9.25
Steel axle turnings	9.25 to 9.50
No. 1 busheling	12.00 to 12.50
No. 1 railroad wrought	14.00 to 14.50
No. 1 cast	13.00 to 13.50
Stove plate	10.00 to 10.50
Bundled tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, November 13, 1912—(*By Telegraph*).

Pig Iron.—An expected quiet period is reported from all sources, although there is some buying of small lots of both Northern and Southern pig iron for filling in. No activity is looked for until all makers open their books for the second quarter. A few small sales of prompt Southern foundry iron have been made as low as $13.50, Birmingham, but this was all resale iron or some special cars that sellers disposed of to avoid demurrage. General letters sent out by different iron merchants have brought in a number of inquiries, but the tone of them would indicate that buyers were simply feeling the market out. There is no activity in basic, and while malleable is still in slight demand, no sales above 100-ton lots have been recorded. The average quotation for prompt shipment Southern No. 2 foundry is $14 to $14.50, Birmingham basis, and Northern foundry is very firm around $16.50 to $17, Ironton. Ferrosilicon is very strong, and considerable business has been booked in the past few days in the Central West. A Southern melter is asking in this market for 500 tons of malleable for January-June shipment, and from central Ohio is an inquiry for approximately 500 tons of either Northern or Southern foundry iron. The lower grades in both markets still continue only 25c. apart. A northern Ohio firm is expected to close for about 100 tons of Jackson County silvery iron within the next few days. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	$17.50 to $18.00
Southern coke, No. 2 foundry and 2 soft	17.25 to 17.50
Southern coke, No. 3 foundry	17.00 to 17.50
Southern, No. 4 foundry	16.75 to 17.25
Southern gray forge	16.50 to 17.00
Old silvery, 8 per cent. silicon	20.20 to 20.70
Southern Ohio coke, No. 1	18.20 to 18.75
Southern Ohio coke, No. 2	17.70 to 18.20
Southern Ohio coke, No. 3	17.45 to 17.95
Southern Ohio malleable Bessemer	17.20 to 17.70
Basic, Northern	17.70 to 18.20
Lake Superior charcoal	19.25 to 19.75
Standard Southern car wheel	25.75 to 26.25

(By Mail)

Coke.—Very little contracting is reported for either furnace or foundry grades, the bulk of the transactions of local agencies being confined to filling in orders for prompt shipment. Very high prices still prevail, and no relief is in sight for the consumer. Inferior grades of Connellsville 48-hr. coke have brought as high as $4 per net ton at oven, and Wise County and Pocahontas brands are held at about the same price. It is probable that contracts can be consummated around $3.25 to $3.50 for first half shipment, with 72-hr. coke running about 25c. to 50c. a ton higher. There is a fairly good demand for domestic coke, but dealers are wary about making promises for any definite shipment dates.

Finished Material.—The railroads are buying odd lots of small structural material and steel bars, and there is a fair demand for the larger sizes of structural

shapes as well as reinforcing concrete bars. Sheets are moving on contracts about as fast as the local mill can obtain cars in which to load them. New business in this particular line is a little slow, as many manufacturers in all districts wish to scrutinize specifications before the acceptance of an order. An advance of about $2 a ton is predicted on both black and galvanized sheets to take effect before the end of the present year. Warehouse prices on steel bars are unchanged at 2c. to 2.10c. and on structural material 2.10c. to 2.15c.

Old Material.—The market is weak, and the quotations given below could probably be shaded about 25c. a ton on many grades. The demand from the rolling mills is not so good, and most of the local dealers have sufficient stocks on hand to make them feel rather independent about making any further large purchases at the moment. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.

Bundled sheet scrap	$10.50 to $11.00
Old iron rails	14.75 to 15.25
Relaying rails 50 lb. and up	21.75 to 22.25
Rerolling steel rails	13.75 to 14.25
Melting steel rails	11.75 to 12.25
Old car wheels	13.25 to 13.75

Per Net Ton.

No. 1 railroad wrought	$11.75 to $12.25
Cast borings	7.75 to 8.25
Steel turnings	8.25 to 8.75
No. 1 cast scrap	11.50 to 12.00
Burnt scrap	8.25 to 8.75
Old iron axles	18.75 to 19.25
Locomotive tires (smooth inside)	12.25 to 12.75
Pipes and flues	8.25 to 8.75
Malleable and steel scrap	9.75 to 10.25
Railroad tank and sheet scrap	7.25 to 7.75

Birmingham

BIRMINGHAM, ALA., November 11, 1912.

Pig Iron.—The maker with the largest supply on hand is still offering spot and first quarter iron at $14, with $14.50 for the second quarter and it is further understood that customers taking both first and second quarter iron can have the two billed at $14.25. These are the lowest quotations made in the Birmingham market. The leading producer adheres to a basis of $14.50 for first quarter and $15 for second quarter, with order books in such comfortable state for six months of next year that there seems to be no danger of that price being shaded. Small sales of foundry for both first and second quarters at these figures have been recently made. Another interest, which has been on the $14.50 minimum basis for several weeks, has not changed and makes weekly sales of 100 to 300 ton lots at that figure both for spot and first quarter. This concern is not quoting for second quarter. The largest holder of stocks has only 25,000 tons left out of the 120,000 tons on hand at this time in 1911, and is understood to have sold 50,000 tons in September and 40,000 tons in October; it had three furnaces in operation until the middle of October when a fourth was blown in, and it has another ready for the torch. The new furnace of the Central Iron & Coal Company at Holt, Ala., will be ready for lighting in a couple of weeks. Three additional furnaces will blow in this month if raw material can be conveniently assembled. Cars are quite scarce. One of the large companies quotes $14 for rest of the year, $14.50 for first quarter and $15 for second quarter, is selling all it cares to dispose of and is rapidly filling up. These three prices about represent the market. Charcoal iron is selling at $25, with a limit on brokers as to the amount to be sold at that figure. Prices f.o.b. furnaces at Birmingham are as follows:

No. 1 soft and foundry	$14.50
No. 2 soft and foundry	14.00
No. 3 foundry	13.75
No. 4 foundry	13.50
Gray forge	13.25
Basic	14.00
Charcoal	25.00

Cast Iron Pipe.—Pipe works continue to ship their entire make, which is near capacity. The influx of orders is steady and sufficient in size to assure the future for some time. The plant of the United States Cast Iron Pipe & Foundry Company at Bessemer, Ala., is shipping on an order for 1000 tons of 12 to 42-in. to Dallas, Texas, and on another from Kansas City. A contract for 1000 tons from Port Arthur, Texas, for 6 to 20-in. has been received. Filling in orders are numerous. Prices are $25 per net ton for 4-in. and $23 for 6-in. and upward, with $1 added for gas pipe.

Coal and Coke.—Coke is strong and in demand to capacity of active ovens at $3.50 to $3.75 per net ton, with inquiries for all that can be made. Coal movements are hampered by the scarcity of cars, which is increasing. Otherwise, output and sales are at a maximum.

Old Material.—Dealers report a strong market, with demand for all kinds of material. It is moving out as rapidly as it comes in. Local foundries are clamoring for cast scrap. Steel scrap is moving to the wire mill at Gadsden, Ala., and wrought scrap to the rolling mill at Knoxville, Tenn. Dealers quote prices actually obtained as follows, per gross ton:

Old iron axles	$16.50 to $17.50
Old steel axles	15.50 to 16.00
Old iron rails	14.50 to 15.00
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	11.50 to 12.00
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	9.00 to 9.50
No. 1 machinery cast	11.50 to 12.00
No. 1 heavy melting steel	11.50 to 12.00
Tram car wheels	12.00 to 12.50
Standard car wheels	13.00 to 13.50
Light cast and stove plate	9.50 to 10.00

St. Louis

ST. LOUIS, Mo., November 11, 1912.

Pig Iron.—New business was confined to small lots, carloads up to 100 tons, with a few inquiries in excess of that, 200 tons being about the limit. The aggregate was quite satisfactory and prices were held firmly, with no indication of softening for the rest of the last quarter at $14 and for the first quarter at $14.50, Birmingham basis, for No. 2 Southern foundry. No. 2 X, Chicago foundry, was advanced during the week to $18 at furnace. Some increase in interest developed toward the close of the week, but the insistence on shipments on contract—and these in excess of estimated requirements in many cases—indicates that there will be new inquiries in the market before long, and further, that the iron shipped is going promptly into use. Car shortage continues a serious factor.

Coke.—There is considerable nervousness and little business is being done except in small lots for peremptory requirements. Specifications on contracts continue to be accompanied with urgent demand for shipment, but the car shortage and the conditions at the ovens make the situation quite unsatisfactory for the consumer. In by-product coke there is no movement of consequence.

Old Material.—In the scrap market quotations remained firm and dealers are confident there will be no more recessions. In fact, gains in prices are looked for. The supply of relaying material is almost exhausted. The lists out during the week included one from the Wabash of 700 tons and one of Chicago & Alton of about 500 tons. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton.

Old iron rails	$15.00 to $15.50
Old steel rails, rerolling	15.00 to 15.50
Old steel rails, less than three feet	14.50 to 15.00
Relaying rails, standard section, subject to inspection	24.00 to 25.00
Old car wheels	15.00 to 15.50
Heavy melting steel scrap	14.50 to 15.00
Frogs, switches and guards, cut apart	14.00 to 14.50

Per Net Ton.

Iron fish plates	$12.50 to $13.00
Iron car axles	20.50 to 21.00
Steel car axles	17.00 to 17.50
No. 1 railroad wrought	12.50 to 13.00
No. 2 railroad wrought	12.00 to 12.50
Railway springs	12.25 to 12.75
Locomotive tires, smooth	13.00 to 13.50
No. 1 dealers' forge	10.00 to 10.50
Mixed borings	8.00 to 8.50
No. 1 busheling	11.00 to 11.50
No. 1 boilers cut to sheets and rings	8.50 to 9.00
No. 1 cast scrap	12.50 to 13.00
Stove plate and light cast scrap	9.50 to 10.00
Railroad malleable	12.00 to 12.50
Agricultural malleable	11.00 to 11.50
Pipes and flues	8.50 to 9.00
Railroad sheet and tank scrap	8.00 to 8.50
Railroad grate bars	10.00 to 10.50
Machine shop turnings	9.00 to 9.50

Finished Iron and Steel.—Specifications on contract are heavy and in more than one instance original contracts have been exhausted by the takings and the second and even third contract have been made by the consumer. The Swenson Construction Company has contracted for about 600 tons of reinforcing bars and 600 tons of steel for fabrication for the first of the eight units of the Sears-Roebuck Building at Kansas City. Light rails were in excellent demand from the coal

interests. In plates the deferred deliveries make large contracts practically impossible at the present time. Track fastenings firmed up under the demand in excess of the normal for this period and are quoted at $2.05 for spikes and $2.40 for bolts, St. Louis.

British Market Quiet

Buying Held Back by War Possibilities —Tin Plate Mills Not Running Full

(By Cable)

MIDDLESBROUGH, ENGLAND, November 13, 1912.

The general situation remains unchanged but fresh buying remains in abeyance. Sentiment has been checked again by fears of Russian-Austrian complications. Pig iron stocks in warrant stores are stationary at 253,000 tons. Semi-finished steel is firm. Welsh tin plate bars have sold at £6 2s. 6d. for prompt delivery. Some tin plate mills are wanting specifications; others are stopping occasionally for lack of bars. German producers of ferromangenese will not sell for the first half. We quote as follows:

Cleveland pig iron warrants (closing Tuesday), 66s. 9d., the same as one week ago, after 4½d. decline meantime.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 67s. 3d., or 3d. less than last week.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5 17s. 6d. for January-March delivery.

German sheet bars, f.o.b. Antwerp, 110s.

German 2-in. billets, f.o.b. Antwerp, 105s.

German basic steel bars, f.o.b. Antwerp, £6 4s.

Steel bars, export, f.o.b. Clyde, £8, an advance of 2s. 6d.

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £7 10s.

German joists, f.o.b. Antwerp, £5 12s. to £5 15s.

Steel ship plates, Scotch, delivered local yard, £8 2s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 15s.

Steel rails, export, f.o.b. works port, £6 15s.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 15s. 4½d.

American Inquiries for Forge Iron—The Australian Rail Order

(By Mail)

MIDDLESBROUGH, November 2, 1912.

Though not generally known there have been some large inquiries in the market for pig iron for shipment to North Atlantic ports, possibly only with a view ot testing the position; but the fact that these inquiries have been received deserves recording. The most important were for forge iron and ran above 30,000 tons, but there have also been inquiries for foundry iron, and the people who have had them to deal with consequently talk in very bullish tones. At the same time it is by no means clear where, if American consumers want forge iron, they are going to procure it, for there is less than 1000 tons in public stores here. Possibly the alternative will be the purchase of scrap. This might be feasible, as scrap has for a long time been rather a drug in the market, though latterly things have taken a turn for the better.

The past week or two seem to have witnessed a little easing down in the position of the Midland makers of common bars, and there is a complaint that specifications are very scarce. No doubt in the rush to buy a few months ago merchants anticipated needs to a certain degree, and the Balkan trouble has caused more real perturbation than can be thoroughly appreciated in the Western Hemisphere. Let it not be imagined meanwhile, however, that the bar iron people are short of orders. They are not. But orders on the books are valueless unless translated in due season into terms of specifications.

Ferromanganese is still anything but an easy market to size up. Business has been done for the United States again at £11 12s. 3d., f.o.b Liverpool, and offers at this level are still open, but it seems highly probable that another advance is in store.

As for semi-finished steel the German Steel Works Union is unable to pick up its arrears, difficulties being added to by recent mill troubles, and grumbling is getting pretty general on the part of consumers. It is impossible to fix up arrangements with the Belgians, and of course America has nothing to part with.

The Australian Commonwealth has badly "muffed" its big rail contract, for merchants have been running round everywhere this week trying to get rails from non-associated makers, but without result. The Cargo Fleet people, whose output is controlled by Dick, Kerr & Co., the big contractors, are now inside the ring and not a single source of independent supply remains open. In despair the Commonwealth authorities have given 10,000 tons of the order to the Lithgow Works in Australia, though at what price no one knows, and the balance of the work must fall inevitably into the lap of the pool, which is in a position to exact its own terms.

Activity Continues in the German Market

BERLIN, October 31, 1912.

The excellent position of the iron market appears to be fully maintained. The Pig Iron Syndicate has opened sales of Luxemburg iron for the first half of 1913 at an advance of 2 to 3 marks a ton; it also added one mark to the prices of Rhenish-Westphalian and other grades to compensate for the advance of coal prices adopted this month. The advance will apparently take effect April 1, when the new coal prices go into operation.

Steel Trade Conditions Are Satisfactory

The Steel Works Union gave out at its regular monthly meeting to-day a favorable résumé of market conditions. It says that home consumers of half-rolled material continue well employed, and that calls for delivery on contracts remain consequently very heavy. The fixing of a price scale for half-rolled material in the home market for the first quarter of 1913 and the opening of sales were postponed to the next general meeting. The foreign market remains favorable and the arrivals of specifications are brisk. The foreign demand for heavy rails is very satisfactory, and the volume of orders in hand is considerably greater than last year. Home business in structural shapes is satisfactory, and the volume of deliveries larger than last year; foreign business has continued very favorable. In these products, also, the opening of business and the fixing of prices for the next quarter were postponed till the next meeting. Business with the Balkan countries, however, which had been very good, has latterly suffered. The postponement of the price list is stated to be due to the uncertainties of the situation, which may mean that the organization is trying to find grounds for advancing prices. According to outside information, a general advance of 2.50 marks was intended, but it was thought best to await developments in connection with the Balkan war before taking action; and the change will be made three weeks hence if the political situation has meanwhile cleared up sufficiently.

In contrast to conditions mentioned last week, it is now reported that great activity prevails in pig-iron sales for the first half of 1913. From the Siegen district it is reported that the furnaces have been assigned orders for spiegeleisen and other manganese grades considerably in excess of their allotments in the Syndicate. It is also mentioned that the remarkable shortage of freight cars prevents the furnaces from delivering promptly, as well as interfering with arrivals of ore supplies.

Variations in Steel Bar Prices

Some reports have been in circulation representing that the bar trade has weakened, but inquiries among leading establishments around Essen brought out denials of this on all sides. At an opening of bids by the railroad authorities at Cologne yesterday, however, considerable variation in the offers on bars was noted. The Phoenix Company, one of the greatest manufacturers of bars in the country, which is now very busy on such orders, offered to supply a lot of 7000 tons at 130 marks; Krupp, Deutscher Kaiser, and Rheinische Stahlwerke bid 125 marks, but certain dealers bid as low as 119 and 120 marks.

Another unsuccessful attempt was made on Tuesday to prolong the organization covering cold-rolled bands, which expires December 31. Efforts are still making to effect a renewal for a half-year, hoping that a permanent agreement may be reached within that time. Sales for the first quarter of next year were declared open at an unchanged price of 205 marks. The managers stated that the market position is favorable, and that the mills are well employed.

A number of conferences were held several days ago by the wire-nail makers, the result of which seems to assure the completion of an organization of this trade by January 1.

The Eisen und Stahlwerk Collart will build a large iron and steel plant at Esch in Luxumburg.

Conditions in Other European Countries

Belgian dispatches report that the export trade has been somewhat quieter for a week, but that no relaxation in prices has been registered. On the other hand, the home price for soft steel bars and light beams has just been raised 2.50 francs. The Fives machine shop at Lille has received orders for 205 locomotives from Russia.

From Austria it is reported that an advance in iron prices is looked for next week.

Russian works continue to send in big orders for pig iron to Silesian furnaces. The scarcity of iron in Russia appears to be very great.

New York

NEW YORK, November 13, 1912.

Pig Iron.—The principal business closed in this district this week was 3600 tons of foundry iron for a New Jersey company, whose inquiry was referred to a week ago. Half the amount was iron of 2.75 to 3.25 per cent. silicon, on which it is understood the price was $17.75 at eastern Pennsylvania furnace. On the remaining 1800 tons, silicon 2 to 2.25 per cent., the price was about $17.50 at Lehigh Valley furnace. A central Pennsylvania furnace took half of the low silicon iron. Deliveries extend over the first half of 1913. There has been comparatively little demand in the past week from the average run of foundries, but some good-sized business is under negotiation, particularly two or three lots, one of these being an inquiry from a large Canadian consumer, which is in the market for basic and foundry irons, and later will be a buyer of malleable, having recently acquired a Canadian malleable plant. The extent of this last inquiry indicates the pressing demand upon Canadian car works, some of which have business that will occupy them well into the fall of 1913. Some scattering inquiry for Southern iron has come again from Genoa and Trieste, but no business has been done as yet. High freights are against it. The recent inquiry from the United States for Cleveland district, England, forge iron probably originated with pipe works which had received inquiries for export cast iron pipe. The drawback, amounting to practically all the $2.50 duty on imported pig iron, would not be sufficient to make foreign iron more economical for a plant taking a foreign pipe order than domestic iron in the present relation of British and American pig iron prices. It is a question if any British iron could be found for shipment to this country in the next few months, even if price conditions were favorable. We quote as follows for Northern iron at tidewater: No. 1 foundry, $18.25 to $18.50; No. 2 X, $17.75 to $18.25; No. 2 plain, $17.25 to $17.75. Southern iron is quoted at $18.25 to $18.50 for No. 1 foundry and $18 to $18.25 for No. 2.

Structural Material.—Conditions are unchanged as regards congestion at the mills. The leading interest still quotes at 1.45c., Pittsburgh, but it is doubtful if it will accept business from those not formerly customers or that business taken now can be rolled before the third quarter. The prices obtaining generally are 1.70c., Pittsburgh, out of stock or for delivery in three or four weeks and 1.60c. for delivery in eight to twelve weeks. Inquiries for a number of buildings are in the market and it is expected that the railroads must shortly come in for considerable amounts for bridge work. Among new building work may be mentioned a 12-story office structure, Broadway, Lispenard and Canal streets, for the Manhattan Hotel Company; 9-story apartment, 55 West Ninety-fifth street, for the Gahren Realty Company; 11-story loft, 245 West Fifty-fifth street, for the Aeon Realty Company; office building, Waterbury, Conn., for the Southern New England Telephone Company; 12-story office building, 63 Broadway, for the American Express Company, which is also to build the 12-story garage on West Forty-fourth street, already mentioned in these columns; Hall of Philosophy, New York University; 6-story warehouse, Buffalo, for the Main Street Realty Company; a building for S. H. Kress & Co. at New Orleans, La., and a 500-ton addition to the Prince George Hotel, New York. The contract awards include 700 tons for the Robertson apartment, Ninety-fifth street and Broadway, to the William Hauptmann Iron Works; 250 tons for an apartment at 105 West Seventy-second street, to the Radley Steel Construction Company; 950 tons for the Brooklyn Union Gas Company building to Levering & Garrigues Company, and several bridges for the Atlantic Coast Line, about 2500 tons, to the Virginia Bridge & Iron Works. We quote plain material at 1.66c. to 1.86c., New York, for mill shipment, according to delivery, and 2.15c. from store.

Steel Plates.—While local business remains dull, mills are still busy and premiums for quick shipment are still heard of, one case of about 5 tons, for example, being shipped a few days after the purchase at 2.50c., mill. One inquiry was heard of for 500 tons for the first quarter for tank plates. The total amount of cars purchased since the last report is about 6200, but the new inquiries or inquiries shortly to be expected keep the total live business to 43,850 cars. The Chesapeake & Ohio requirements appear to be 2000 instead of 3000 cars and the Illinois Central 3000 gondola instead of 6000 as first reported. It is interesting to add that the Louisville & Nashville after receiving bids decided not to buy the 1200 underframes which it was considering to use with its own built bodies. The Duluth & Iron Range is considering 950 cars and the Duluth, Missabe & Northern, 1000 cars, a total for the two roads 450 larger than first reported. The Westmoreland Coal Company is inquiring for 100 gondola and 100 hopper cars; the Missouri Pacific, 2000 box and 2000 gondola; Swift & Co., 250 center constructions; the Canadian Pacific, 500 flat cars; the Coal & Coke Railway, Elkins, W. Va., 500 gondola, and the Atlantic Coast Line, 300 flat cars. The awards include 300 rack cars to the Laconia Car Company, 100 flat to the Keith Car & Mfg. Company and 100 gondolas to the Standard Steel Car Company for the Maine Central; 500 hoppers to the Cambria Steel Company and 500 various types to the Standard Steel Car Company for the New York, Ontario & Western; 1000 for the Pittsburgh & Lake Erie to the Standard Steel Car Company, which also took 500 steel box cars for the Erie and probably 100 passenger cars for the New Haven, as well as 600 box cars for the Pennsylvania Lines West. The American Car & Foundry Company also took 600 for the Pennsylvania Lines West and 1000 box cars for the San Antonio & Aransas Pass, and also 800 box for the New York, Philadelphia & Norfolk. For this road the Ralston Steel Car Company is to build 50 gondolas. The Pullman Company will build the 1100 refrigerator and 2500 box cars for the Northern Pacific and the Bettendorf Axle Company the 3000 underframes for the St. Paul. The Laconia Car Company is to build 8 caboose cars for the New York Central. Sheared plates are quoted at 1.76c. and universal plates, 1.81c., except for forward delivery, when they obtain 1.66c. to 1.71c., all New York.

Iron and Steel Bars.—Bar iron is still higher, higher than steel bars and used probably more than ever in place of steel bars, which are so difficult to obtain. Prices are probably minimum at 1.60c. at mills, though one large buyer has been told that 1.65c. must be paid. There is not much business being placed in steel bars for future delivery, as buyers generally are well provided for in contracts into 1913 and the steel companies are not anxious to entertain further offerings. It is understood that the Boston & Maine and the New Haven have bought spikes for the first half, about 30,000 kegs being involved at a price around $1.80. Steel bars remain nominally at 1.40c., Pittsburgh, or 1.56c., minimum New York, mill shipments, and from store, 2c. Refined iron bars are 1.70c. to 1.75c., New York, and from store, 2c.

Ferroalloys.—The ferromanganese situation is unchanged, as far as the matter of supply is concerned, some agents of producers still being out of the market for next year's delivery. Spot and prompt is quoted from $72.50 to $75, and in some cases the latter price has been obtained. The tendency is decidedly upward. In the last few days about 1500 tons of ferromanganese has been bought for next year at a price reported to be $61, Baltimore, and about 1500 tons for delivery in the first half of next year remains to be placed. Quotations for forward delivery have stiffened and some interests name $62.50 to $65 for first half of 1913 and $61 for second half. There is some inquiry, but it is not general. The United States Steel Corporation has not yet placed its order for the 6000 to 8000 tons of ferrosilicon it will need for next year, and outside of this large requirement some 300 tons is pending also. Prices are unchanged at $75, Pittsburgh, for carloads, $74 for 100 tons and $73 for 600 tons or over. It is reported that the United States Steel Corporation is in the market, or soon will be, for about 1800 tons of ferrochrome, while other interests are inquiring for 600 tons.

Cast Iron Pipe.—The city of Providence, R. I., awarded the contract for 2500 tons to the Standard Cast Iron Pipe & Foundry Company. The Department of Water Supply, Gas and Electricity of the city of New York will open bids November 20 for 2300 tons, principally 8's and 12's, for the Borough of Richmond

(Staten Island). Private buying keeps up remarkably well, due to the continuance of unusually favorable weather for outdoor work. Stock orders are being placed quite freely for spring delivery by water and gas companies, but the buying of this character is much under what might be expected. The opinion is expressed that many consumers who should now be covering at least a portion of their spring requirements will be obliged to pay considerably higher prices by deferring their purchases. Carload lots of 6 in. are quoted at $24 to $25 per net ton, tidewater.

Old Material.—The market is in a somewhat unsatisfactory condition. The supply of steel scrap has for some time been larger than the mills have been able to digest, and consumers' bids are therefore considerably under recent prices. It is stated that but one eastern Pennsylvania steel company is willing to take any steel scrap at present, and it is offering $14.50 delivered at its works. Others are so well supplied that they are withholding all bids. On the other hand, some classes of rolling mill stock are scarce and higher. Cast scrap is in good demand, although prices are not so firm as they were. Dealers' quotations are as follows per gross ton, New York and vicinity:

Old girder and T rails for melting	$12.25 to $12.75
Heavy melting steel scrap	12.25 to 12.75
Relaying rails	22.50 to 23.00
Rerolling rails	15.00 to 15.50
Iron car axles	24.00 to 25.00
Old steel car axles	18.00 to 18.50
No. 1 railroad wrought	15.25 to 15.75
Wrought iron track scrap	13.50 to 14.00
No. 1 yard wrought, long	13.00 to 13.50
No. 1 yard wrought, short	12.50 to 13.00
Light iron	5.50 to 6.00
Cast borings	9.25 to 9.75
Wrought turnings	9.50 to 10.00
Wrought pipe	11.50 to 12.00
Old car wheels	15.00 to 16.00
No. 1 heavy cast, broken up	12.00 to 12.50
Stove plate	9.75 to 10.00
Locomotive grate bars	9.50 to 10.00
Malleable cast	11.50 to 12.00

Buffalo

BUFFALO, N. Y., November 12, 1912.

Pig Iron.—A fair amount of new business is running, a considerable portion of which comprises demand from small foundries for prompt shipment, many now operating on slender stocks. Pressure for quick deliveries on existing contracts also continues and shipments are going forward from furnaces in unprecedented volume. The aggregate of transactions for the week is about 14,000 or 15,000 tons of all grades, with a fairly large tonnage still under negotiation. Prices are practically unchanged, except that the maximum price for No. 1 foundry and malleable has been slightly raised, $18 now being obtained for each of these grades for prompt shipment. For first half delivery we quote as follows, f.o.b., Buffalo:

No. 1 foundry	$17.50 to $18.00
No. 2 X foundry	17.25 to 17.50
No. 2 plain	17.00 to 17.25
No. 3 foundry	17.00
Gray forge	16.75 to 17.00
Malleable	17.50 to 18.00
Basic	17.50 to 18.00
Charcoal, regular brands and analysis	18.75 to 19.25
Charcoal, special brands and analysis	22.00

Finished Iron and Steel.—Specifications against contracts are being placed freely, with comparatively little canceled tonnage as a result of the monthly quota clause of contracts, which requirement is being rigidly followed by a number of the leading steel interests. Practically all purchasers are taking out their full allotments and are placing specifications as far ahead as possible, endeavoring to get them on file at the mill from one to three months in advance of dates for specification required by contract. Deliveries are running from four to six months from date of specification. Prices for bars, plates and shapes are unchanged and very firm. The demand for wire products remains strong and some advance in price is likely before the end of the year. The demand for sheets continues good at firm prices. Contract covering the Erie Barge Canal Terminal at Rome, N. Y., is to be let to-day, calling for about 500 tons of sheet steel piling. In fabricated structural lines the market shows something of a lull, natural at this time of the year. It is stated that in some instances structural material is being ordered for delivery in third and fourth quarters of 1913 to make sure of securing material at that time.

Old Material.—The local demand for most grades of scrap material continues to be of fair volume but buying from eastern Pennsylvania and other outside districts has fallen off, manufacturers appearing to have sufficient stock on hand for the present. Although this has had a slight tendency to weaken prices, no quotable change has taken place for any commodity. We quote as follows per gross ton f.o.b. Buffalo:

Heavy melting steel	$14.75 to $15.25
Low phosphorus steel	17.00 to 17.50
No. 1 railroad wrought	16.00 to 16.50
No. 1 railroad and machinery cast scrap	14.00 to 15.00
Old steel axles	16.75 to 17.00
Old iron axles	24.50 to 25.00
Old car wheels	15.50 to 16.25
Railroad malleable	13.50 to 14.00
Boiler plate sheared	15.00 to 15.50
Locomotive grate bars	11.75 to 12.25
Wrought pipe	10.50 to 11.00
Tank iron	10.75 to 11.25
Wrought iron and soft steel turnings	8.75 to 9.00
Clean cast borings	8.00 to 8.50

Boston

BOSTON, MASS., November 12, 1912.

Old Material.—The market has weakened somewhat, and heavy melting steel has dropped slightly because of the tendency of the mills to hold off buying. They have large stocks of scrap, and in the opinion of the dealers are taking the opportunity to bear the market. The belief here is that prices have struck their high point for 1912, but that the check is only temporary. The quotations given below are of prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	$12.25 to $12.50
Low phosphorus steel	14.00 to 15.00
Old steel axles	15.00 to 15.50
Old iron axles	23.00 to 23.50
Mixed shafting	14.75 to 15.25
No. 1 wrought and soft steel	12.25 to 12.75
Skeleton (bundled)	10.75 to 11.25
Wrought iron pipe	10.75 to 11.00
Cotton ties (bundled)	10.75 to 11.00
No. 2 light	4.50 to 5.00
Wrought turnings	8.50 to 8.75
Cast borings	8.00 to 8.50
Machinery, cast	13.50 to 14.00
Malleable	11.00 to 11.50
Stove plate	9.00 to 9.50
Grate bars	8.00 to 8.25
Cast-iron car wheels	13.50 to 14.00

Metal Market

NEW YORK, November 13, 1912.

The Week's Prices

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead		Spelter	
Nov.	Lake.	Electrolytic.	Tin New York.	New York.	St. Louis.	New York.	St. Louis.
7	17.62½	17.37½	50.20	4.72½	4.57½	7.45	7.30
8	17.62½	17.37½	50.10	4.72½	4.57½	7.45	7.30
9	17.62½	17.37½	.....	4.72½	4.57½	7.45	7.30
11	17.75	17.55	49.65	4.72½	4.57½	7.45	7.30
12	17.75	17.55	49.70	4.72½	4.57½	7.45	7.30
13	17.75	17.55	50.00	4.72½	4.57½	7.45	7.30

Early delivery copper is higher and strong; inquiry is better but consumers are reluctant to buy. Tin has undergone little change except for a betterment in inquiry for future delivery. Lead is dull and lower. Spelter is weaker. Antimony is firmly held.

New York

Copper.—A rather widespread inquiry has developed from consumers of moderate and small quantities, and considerable business resulted at higher prices. It is thought probable that even more buying would have occurred but for the advancing prices which came with the increased activity. Prompt delivery metal at recessions is now difficult to find if it can be had at all, as the holders are aware of their stronger position and are inclined to wait for the better prices which they believe November and December deliveries should obtain. They know that when the resale metal is taken up recourse must be had by consumers to the large interests who are sticking to their basis of 17.62½c., cash New York, for electrolytic. Sales were made last week for delivery next year at prices ranging from 17.37½c. to 17.45c., cash, f.o.b. New York. The many inquiries are evidence that consumers are ready to come into the market at a price, and it is therefore probable that a reduction in price would start a good buying movement despite the fact that the heavy consumers are covered. The statement of the Copper Producers' Association for October, issued November 8, which showed an increase of 13,679,377 lb. in stocks, had little or no effect on the market, as the figures had been anticipated. Lake copper is quoted at the full price of 17.75c. and

electrolytic at 17.55c., New York. The London price to-day is £76 15s. for spot and £77 10s. for futures. The exports this month have been very light, totaling only 5334 tons. Government statistics show that imports of copper have been heavy, the September arrivals having been 14,000 tons, making the total for nine months of 1912 130,000 tons.

Pig Tin.—Inquiries for future positions of tin have been more numerous in the last few days, particularly Monday and Tuesday, and it is evident that if buyers and sellers could have got together on price a very fair amount of trading would have been done. As it was, rather a small amount of business ensued. Spot is practically unchanged and continues to be taken only by those who are in urgent need, and even these buyers appear to wait until the last minute. Meanwhile the average of fairly high prices holds up despite the usual variations in London, which are of course reflected here. The Minneapolis, due next week, is bringing 1000 tons of tin and the outlook is for an ample supply this month. The price of tin in New York to-day is 50c. and in London £228 10s. for spot and £228 5s. for futures. The arrivals this month were 824 tons and there is afloat 1920 tons.

Tin Plates.—The local demand for tin plates continues fair as far as the jobbers are concerned, although with the large consumers their contracts are practically all placed and the larger market is slackening.

Lead.—This metal is dull and the market is characterized by a very ardent desire to sell at 4.72½c., New York, or 4.57½c., St. Louis, and it is not believed that an offer of 4.55c., St. Louis, would be overloked by holders of lead; in fact, there can be no doubt that the prices quoted could be substantially shaded. The consumption of lead continues good and a further decline would undoubtedly precipitate a good buying movement.

Spelter.—The demand has been dull and a sagging tendency is shown despite recent assertions that the metal would not recede further in price. The New York price is 7.45c. to 7.50c., New York, and 7.30c., St. Louis.

Antimony.—This market is characterized by considerable amount of profit taking by dealers and speculators who anticipated the recent advance in prices. The import price of anitmony is 10.50c. for Cookson's, 10c. for Hallett's and 9.50c. for Chinese and Hungarian grades, but the real market price as made by the extensive offering of resale metal is 10.37½c. for Cookson's, 9.75c. for Hallett's and 9.37½c. for other brands.

Old Metals.—Quiet conditions continue. Dealers' selling prices are nominally unchanged as follows:

	Cents per lb.
Copper, heavy and crucible	16.75 to 17.00
Copper, heavy and wire	16.50 to 16.75
Copper, light and bottoms	14.75 to 15.00
Brass, heavy	10.25 to 10.50
Brass, light	8.50 to 8.75
Heavy machine composition	13.75 to 14.00
Clean brass turnings	9.75 to 10.00
Composition turnings	12.00 to 12.50
Lead, heavy	4.75
Lead, tea	4.50
Zinc, scrap	6.25

Chicago

NOVEMBER 12.—Pig tin is a trifle weaker. Copper is stronger. We quote as follows: Casting copper, 17.75c.; Lake, 17.87½c. to 18c., in carloads for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 50.75c.; small lots, 53c.; lead, desilverized, 4.75c. for 50-ton lots; corroding, 5c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 7.50c.; Cookson's antimony, 11.25c., and other grades, 10.50c. in small lots; sheet zinc is $9, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 17c.; copper bottoms, 15c.; copper clips, 15c.; red brass, 13c.; yellow brass, 10c.; lead pipe, 4.25c.; zinc, 5.50c.; pewter, No. 1, 33c.; tinfoil, 39c.; block tin pipe, 45c.

St. Louis

NOVEMBER 11.—The metal market was quiet during the week, though the aggregate of business was fairly satisfactory, all things considered. Lead showed some weakness, falling off to 4.60c. at the close of the week, while spelter was firm at 7.25c. Lake copper continued at 17¾c. to 18⅛c. and electrolytic copper at 18c. to 18¼c. Tin was quotable at 49⅝c. to 50¼c. and antimony, Cookson's, at 10⅞c. In the Joplin ore market production kept up at a good gait and the sales of zinc blende ranged from $61, the top price for the choicest grades offered, down to $52 per ton. This is a top decline of $1. The general range for 60 per cent. ore was from $52 to $57. Calamine sold as high as $37, but the basis range for grades carrying 40 per cent. was from $29 to $33. Lead ore was in weak demand at $58 on an assay basis of 80 per cent. We quote miscellaneous scrap metals as follows: Light brass, 6½c.; heavy brass and light copper, 10½c.; heavy copper and copper wire, 13c.; zinc., 4½c.; lead, 4c.; pewter, 25c.; tinfoil, 32c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, November 13, 1912.

Unsettled European conditions have again influenced security values on this side of the Atlantic. The discussion of tariff revision has not been without some unfavorable effect. Prices generally have declined below the level of last week. The range on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Bald. Loco., com...	56½- 58	Pressed Steel, com.	37 - 39¼
Bald. Loco., pref...	106⅞-107	Pressed Steel, pref.	101½
Beth. Steel, com....	42½- 46¼	Railway Spring, com.	36¼- 38
Beth. Steel, pref...	73½- 75½	Republic, com.	28¾- 33
Can, com.	38¾- 43½	Republic, pref.	91½- 93
Can, pref.	121 -123⅜	Sloss, com.	55 - 56
Car & Fdry., com..	58⅜- 61	Pipe, com.	18¾- 19½
Car & Fdry., pref.	119½	Pipe, pref.	62 - 63
Steel Foundries....	40 - 42⅜	U. S. Steel, com...	73½- 78⅝
Colorado Fuel	35 - 38½	U. S. Steel, pref...	111½-113½
General Electric....	180½-183½	Westinghouse Elec..	80 - 84¼
Gr. N. Ore Cert....	45 - 48¾	Va. I. C. & Coke...	65 - 65½
Int. Harv., com.....	119¼-122⅜	Am. Ship, com.....	54½- 58
Int. Harv., pref....	118⅜-119	Chic. Pneu. Tool...	53¾- 54¾
Int. Pump, com.....	22 - 24⅞	Cambria Steel	48¾- 52
Int. Pump, pref.....	80	Lake Sup. Corp.....	30 - 31⅝
Lackawanna Steel...	45 - 46	Pa. Steel, pref.....	95 - 96
Locomotive, com....	44 - 46	Warwick	10¼
Locomotive, pref....	103½-106⅞	Crucible Steel, com.	17 - 18¼
Nat. En. & St., com.	20½- 23¼	Crucible Steel, pref.	95½- 97
Nat. En. & St., pref.	93⅛	Harb. Wk. Ref., com.	51¼
Pittsburgh St., pref.	101¾	Harb. Wk. Ref., pref.	102

A Chicago dispatch reports a bid of $500 per share for common stock of the American Radiator Company, which compares with a recent sale price of $405. There is talk of a 15 per cent. stock dividend within two months and the acquisition of another independent concern. The stockholders have a great equity in the company's foreign plants.

Dividends Declared

The American Smelting & Refining Company, regular quarterly 1¾ per cent. on the preferred stock, payable December 2, and 1 per cent. on the common stock, payable December 16.

The Niles-Bement-Pond Company, regular quarterly, 1½ per cent. on the preferred stock, payable November 15, and 1½ per cent. on the common stock, payable December 21.

The Pratt & Whitney Company, regular quarterly, 1½ per cent., on the preferred stock, payable November 15.

The Studebaker Corporation, regularly quarterly, 1¾ per cent. on the preferred stock, payable December 2.

The General Electric Company, regular quarterly, 2 per cent., payable January 15.

Deere & Co., regular quarterly, 1¾ per cent. on the preferred stock, payable December 1.

H. O. Kendall and J. J. Skinner of Philadelphia, Pa., have leased from the State of Texas the long idle blast furnace, foundry and pipe factory at the penitentiary at Rusk for a period of two years. They will use free labor. They own outright 80,000 acres of iron ore land in Cass County and have options on more than 100,000 additional acres. They estimate that they own at least 50,000,000 tons of ore. It is their purpose, if they find the plant at Rusk can be operated profitably, to erect their own furnaces and a large iron and steel plant. The latter will probably be located at Texarkana, it is stated.

The Alton Steel Company is the name of the company which has been organized to build a steel hoop mill at Alton, Ill. Announcement is made that it will be equipped with four 35-ton open-hearth furnaces and will have a daily capacity of 300 tons. The company will have a temporary capital stock of $10,000, which will be increased. Among those interested are T. S. Clark, Erie, Pa., formerly with the Perry Iron Company; J. R. Hastings, Lima, Ohio, of the Ohio Steel Foundry Company; E. J. Anglin, Pittsburgh, and George Schauwecker, Sharon, Pa.

The Ohio Society of Mechanical, Electrical and Steam Engineers will hold its eleventh annual meeting November 21 to 23 at the Hotel Portage, Akron, Ohio. An interesting programme has been prepared.

Personal

William H. Wright, who for eight years has been with the Zenith Furnace Company, Duluth, Minn., has resigned and after January 1 will be with the United Coke & Gas Company, New York, in charge of its operating department. For some years Mr. Wright has been in charge of the Zenith Furnace Company's Otto-Hoffman coke ovens.

Percival Johnson has been elected general manager of the Pulaski Iron Company, operating Pulaski furnace at Pulaski, Va. He succeeds John W. Eckman, who has filled that position for a number of years and recently tendered his resignation.

John Hulst, formerly chief engineer in the Youngstown district for the Carnegie Steel Company, has been appointed chief engineer at Pittsburgh to succeed E. E. Slick, who resigned November 1 to become general manager of the Cambria Steel Company. Mr. Hulst entered the employ of the Carnegie Company in 1901 and has been continuously with it since, with the exception of a period of six months when he was located at Sharon, Pa. He is succeeded by Fred Kling.

Fred Krebs, who resigned some time ago as manager of sales of the Cambria Steel Company, has been elected a vice-president of the United States National Bank, Johnstown, Pa., and will take an active part in its affairs. He has been a director of this bank since its organization.

Capt. Robert W. Hunt is to be awarded the John Fritz medal this year. The exercises in that connection are scheduled to take place in New York, December 5, and the American Society of Mechanical Engineers, which had planned to hold its annual reunion and dance that evening as usual in the week of the annual meeting, has abandoned the function this year.

Rich. Lindenberg, general director of Stahlwerke Rich. Lindenberg, Remscheid, Germany, and F. Rich. Eichoff, professor of metallurgy of iron, Berlin, sailed on their return to Europe November 7, after a week's stay in this country.

Charles M. Schwab will be the chief speaker at the annual dinner of the Chamber of Commerce, Youngstown, Ohio, November 26. His subject is "Sentiment in Business."

E. F. and D. M. Kitselman, wire manufacturers, Muncie, Ind., have gone on a trip around the world. They will study industrial conditions while abroad.

John Hulst, who has resigned as district engineer of the Carnegie Steel Company at Youngstown, Ohio, to accept the position of chief engineer, located at Pittsburgh, was given a complimentary dinner by employees of the operating department and was presented with a traveling bag, toilet set and gold cuff buttons. He assumed his new position in Pittsburgh November 11.

M. J. Butler has resigned as vice-president and general manager of the Dominion Iron & Steel Company, Sydney, Nova Scotia, the change to become effective January 1.

John Wilson Drown, formerly advertising manager for the Standard Roller Bearing Company, Philadelphia, Pa., has been made general manager of the Pressed Steel Mfg. Company of the same city, maker of ball bearings, with offices at 504 Land Title Building.

James G. West, formerly assistant superintendent of the Edgar Thomson blast furnaces of the Carnegie Steel Company at Bessemer, Pa., has been made assistant superintendent of the South Chicago furnaces of the Illinois Steel Company.

Edward B. Cook, until recently general manager of the Warwick furnaces, Pottstown, operated by the Eastern Steel Company, Pottsville, Pa., has resigned and accepted a position in the ore and blast furnace departments of Pickands, Mather & Co., Cleveland, Ohio, with headquarters in that city.

J. Friedenstein, director of William Cooke & Co., Ltd., Sheffield, England, whose American representatives are John Helmuth & Co., 30 Church street, New York, is at present on a visit to the United States and Canada in the interest of his company.

President James Inglis, of the American Blower Company, Detroit, Mich., has just returned from a visit to the Sirocco Engineering Works, Belfast. He found trade in Sirocco blowers very active over there, just as it is on this side of the Atlantic.

Henry S. Snyder, vice-president Bethlehem Steel Company, is in Chili.

Obituary

CLEMENT A. GRISCOM, one of the founders of the International Mercantile Marine Company, and a director of the United States Steel Corporation, died November 10, at his home at Haverford, Pa., aged 72 years. He was born in Philadelphia, and after receiving his education in the public schools and the Friends Academy, entered the old shipping house of Peter Wright & Sons, rising in six years from a clerk to a partner and becoming prominent in the establishment at the age of 22. He was one of the founders and the first president of the American Society of Naval Architects and Marine Engineers, and was a director of the Pennsylvania Railroad Company, and of more than a score of financial institutions. He was a member of numerous clubs in Philadelphia, New York and London. He leaves a widow, three sons and two daughters. One of his sons, Lloyd C. Griscom, was formerly ambassador to Italy.

REUBEN WELLS, Paterson, N. J., died November 8, aged 84 years. He was a prominent locomotive builder. In 1868 he designed and superintended the construction of the first locomotive especially built for grade climbing. In 1887, after serving for a long time as master mechanic of railroad companies, he became superintendent of the Rogers Locomotive Works at Paterson, continuing in that position until the company was taken over by the American Locomotive Company in 1908. He was requested to remain a superintendent by the new management, but decided to retire from active life.

JOHN FORAN, Flemington, N. J., died November 10, aged 68 years. He was born in Ireland, coming to this country at an early age and serving in the Civil War. He was president of the Foran Foundry & Mfg. Company, Flemington's largest industry, and was a director and vice-president of the Flemington National Bank.

SIR CHRISTOPHER FURNESS, known at the time of his death as Lord Furness, head of Furness, Withy & Co., shipbuilders, died in London, England, November 10, aged 60 years. He served for a number of years as member of Parliament.

BENJAMIN TAYLOR LONGSTRETH, for many years connected with Morris, Wheeler & Co., iron and steel merchants, Philadelphia, died at his home in Rosemont, Pa., November 11, aged 64 years.

German Pig Iron Combination Completed

Our Berlin correspondent states that matters have finally been satisfactorily arranged between the Essen Pig Iron Syndicate and the Luxemburg-Lorraine group of iron companies. He says: "Some of the most important of the Luxemburg-Lorraine makers maintained a sort of separate organization, which had made an agreement with the syndicate to hold till the end of 1912. For some time negotiations have been in progress between this group and the syndicate. The latter demanded—as was duly reported several weeks ago in this correspondence—that the Luxemburg-Lorraine makers give up their organization altogether and enter the syndicate as ordinary members. They were given till a certain date to consider the matter. They have now decided to join the syndicate, the arrangement to hold till the end of 1917. Only three concerns remain aloof, but they cut scarcely any figure in the pig iron trade."

Sale of Canadian Malleable Foundry.—The Canadian Car & Foundry Company, Montreal, which has larger car orders on hand than at any time in its history, has acquired the malleable castings plant and business of the Pratt & Letchworth Company, Brantford, Ont., hitherto a branch of the Pratt & Letchworth Company, Buffalo. The name and the operating organization will remain unchanged. Some additions to the plant are planned. At present 500 men are employed.

The Panama Canal Commission has awarded a contract to the United States Steel Products Company for 3500 tons of structural steel work, to cost about $410,000, for Panama Canal buildings. These include machine shops, forge shops, steel storage sheds, paint and car shops, planing mills, foundries, coke sheds, boiler houses, roundhouses and gas houses.

Pig Iron Freight Rate Hearing

Producers and Consumers of Southern Pig Iron Ask Lower Rates to Northern Points

WASHINGTON, D. C., November 8, 1912.—Yesterday, in this city, the Interstate Commerce Commission began the hearing of testimony in the complaints of the Sloss-Sheffield Steel & Iron Company and others against the Louisville & Nashville Railroad and others. Four witnesses were heard at the sessions yesterday and to-day, namely, James Bowron, Birmingham, Ala., trustee in bankruptcy of the Southern Iron & Steel Company; George H. Barbour, Detroit, Mich., vice-president and general manager Michigan Stove Company; James W. McQueen, Birmingham, vice-president Sloss-Sheffield Steel & Iron Company, and Frederick Sattler, Belleville, Ill., president Belleville Stove & Range Company.

The complainants in this case, iron and steel manufacturers, demand a reduction in the freight rate on pig iron from the Birmingham district in Alabama to Ohio River crossings and Chicago. From Birmingham to Louisville the present rate is $3 per ton; from Birmingham to Cincinnati, Evansville and Cairo, the rate is $3.25. The complainants ask the commission to reduce the rate to $1.82 to all these points and the rate from Birmingham to Chicago from $4.35 per ton to $3 per ton.

Commissioner McChord, who presided at the hearing, at the opening of Thursday's proceedings allowed the intervening petitioners to file petitions asking for reparation.

Mr. Bowron said that the Southern Iron & Steel Company produces coal, pig iron, open hearth steel, ingots, billets, steel wire, wire nails, etc. He said that the bankruptcy of the company had taken place since the filing of the complaint in this case and its bankruptcy was produced by its inability to obtain as much money for its products as it cost to produce them. He came to the United States in 1877, representing a large amount of English capital which was invested in the purchase of properties in Tennessee with a desire to develop them, and he said that under his personal care blast furnaces were built at South Pittsburgh, Tenn., and ore mines were developed at Inman, Tenn., and coal mines at Victoria, Tenn. He said that at the present time his company had four blast furnaces with an aggregate capacity of about 750 tons a day; its open hearth steel works has a capacity of 550 tons a day of steel billets; its wire works 150 tons a day, and its bar mill 100 tons a day of bars and light rails. Mr. Bowron devoted a great deal of the time he was under examination by William A. Wimbish, chief attorney for the complainants, and Frank Lyon, representing the complainants also, to a detailed history of the iron and steel business in the South, and of the increased cost of operation within the past 10 years. His testimony was very technical and entered into all features of the business. He said:

> It is axiomatic that iron is the barometer of trade. That is looked upon as a truism. So far as the locality is concerned, northern Alabama and some parts of middle Tennessee are almost entirely dependent upon the prosperity of the iron trade. There is no other great staple industry. Adversity in that industry and the closing of the furnaces in the Birmingham district would produce destitution on the part of many thousands of workmen, who would have to sacrifice their homes, in many cases partly paid for on the instalment plan.

Mr. Wimbish asked the witness: "I ask you if, in your opinion, the present rates on pig iron from Birmingham to the Ohio River points and beyond and to the East are fair, just and reasonable, and, if not, state the facts on which you base that opinion." Mr. Brown replied:

> I do not think them just and reasonable, because the swing of the pendulum, under the application of the Interstate Commerce Commission rules, has stopped the operation of a sliding scale. The pendulum stopped at one side altogether. If the sliding scale had stopped in the middle, probably both parties would have been satisfied. If it had stopped at the bottom, we would have had the railroads long since applying for an advance in the rates. But it stopped at the top, and the furnace companies have borne for the past five years, since the panic of 1907, the extreme misery of paying rates fixed on an $18 pig iron price, when the price has dropped to $10 a ton, and we have seen the markets taken away from the producers of the South, one after another. The area wherein the Southern iron is distributed has become circumscribed to a little more than one-half of the population which it furnished twenty years ago.

Vice-President Barbour, of the Michigan Stove Company, said that his factory uses 9000 or 10,000 tons of pig iron a year and that in his purchases for the first six months of the next year he has cut the Southern iron tonnage in two, due to the excessive freight rate, which at the present time is $4.50 a ton from the Birmingham district. He said that he was interested in the present proceedings as a consumer and that the disappearance of Southern iron in Northern markets as a factor of competition would result, and afford an opportunity for the manufacturer of the Northern iron substitute increasing his prices unjustly.

Vice-President McQueen, of the Sloss-Sheffield Steel & Iron Company, gave a detailed history of the iron and steel industry in the South and placed in the record a series of statistics to prove the assertion made by the complainants that the freight rates alone on Southern pig iron had restricted the growth of this business in the South. The figures presented by Mr. McQueen showed that the production of pig iron in the United States as a whole increased 100 per cent. in the past 10 years and the production in the Southern States increased but 61 per cent. He said that the cutting of $1 per ton off the rate to Ohio River crossings would result in reasonable rates to the North and East. He also placed in the record statistics from trade journals and similar sources, numerous maps, blue prints, etc. He agreed to furnish later statistics showing the elements of cost entering into the production of pig iron in Southern furnaces. He said that in recent years 1910 and 1911 were the hardest years his company had passed through.

In substance, the figures offered by Mr. Bowron and Mr. McQueen indicated that about 50 furnaces in the Southern territory are affected in the present case and that 30 of these are out of blast, due to the present adjustment of freight rates.

President Sattler, of the Belleville Stove & Range Company, was the last witness at Friday's session. He appeared as chairman of a committee representing the Western Central Association of Stove Manufacturers, intervening in the proceedings to protest against the present rates from Birmingham to Ohio River crossings and other Northern points as excessive. He said that the association he represented uses about 150,000 tons of pig iron annually and that 90 per cent. of this comes from the South.

Wellman-Seaver-Morgan Contracts

Orders for 29 Hughes gas producers for the Carnegie Steel Company's Edgar Thomson works, 24 Hughes producers for the Minnesota Steel Company and gas producer equipment for the open-hearth plant of the Inland Steel Company have been placed with the Wellman-Seaver-Morgan Company, Cleveland, Ohio. This company has also recently received from the Chesapeake & Ohio Railroad an order for a double car dumper and coal handling equipment, which will be similar in many respects to one that is now being erected by the same builder for the Norfolk & Western. Other orders include two coke pushers for the Semet-Solvay Company and a large number of small gas producer installations. The company has further taken two orders for large hydraulic turbines and reports a very active demand for mining hoists. The past week it shipped a specially designed 140,000-lb. turbine, being the first of six that are being built for the Mississippi River Power Company, Keokuk, Iowa. The company now has under erection pontoons for the navy yards at Boston and Honolulu.

The Security Steel & Iron Company, Troy, N. Y., dealer in old material, is now wrecking the famous Congress Hall Hotel, Saratoga Springs, N. Y. It will have for sale a very great quantity of all kinds of materials used in the construction of this building. The company has a branch office at 140 Nassau street, New York.

The Pittsburgh Crucible Steel Company has purchased from the Morgan Construction Company, Worcester, Mass., for its new works at Midland, Pa., the entire equipment for a continuous merchant bar mill plant, including gas producers, 14-in., 12-in. and 8-in. mill trains, cooling bed and shears.

British Exhibition of Machine Tools

Official Catalogue Indicates the Scope of the Recent Engineering and Machinery Exposition at Which American Manufacturers Were Represented

Some interesting features of the International Engineering and Machinery Exhibition, organized by the Machine Tool and Engineering Association, Ltd., London, and held at Olympia October 4 to 26, are to be learned from a perusal of the official catalogue, copies of which have reached this country. It is a paper covered volume of 366 pages, 7 x 9¾ in. in size, and contains brief descriptions of over 250 exhibits, interspersed with attractive advertising. About two-fifths of the right-hand side of each page is blank space, over which are printed the words "Visitors' Notes."

Preliminary to the catalogue proper is a list of patrons of the exhibition, among which are many titled persons and eminent engineers; a full page portrait of the Earl of Selborne, K. G., G. C. M. G., opener of the exhibition; another of H. J. Mackinder, M. P., president of the Machine Tool and Engineering Association, Ltd.; a group of portraits of directors of the same association and of the organizing managers; lists of the officers of the association and of the members; a list of the official contractors, such as stand fitters, electrical workers, haulage firms, photographers, translators, stenographers, etc. Speaking of progress made by the British machine tool makers, it is stated in the introduction to the catalogue:

> British machine tool makers have gone far in the recent years; how far, the present exhibition will provide a means of judging. Not that the exhibition contains many surprises; development in design is a matter of relatively small gradations, and to estimate the progress made we must pay attention to the details of the machines on view. The most straightforward development has taken place in the case of the ordinary lathe, the marvelous increase in the power of which is due to the use of high-speed steel and cutting tools. Further, the increase in the number of classes of materials used for mechanical engineering purposes during the past decade necessitates a wider range of speeds and a finer speed adjustment than has hitherto been necessary. In order that the best results may be obtained from a high-speed tool steel, work must be carried out at the highest permissible speed, which naturally varies with the material cut. This has led to the supersession of the cone pulley and belt shifting by the all-gear head, enabling full belt speed to be employed for all diameters of work. The ideal arrangement would provide continuous speed gradation between the upper and lower limits, and this has been actually obtained in some designs.
>
> More subtle and complex are the developments in the turret lathe, in which the field of improvement is bounded by the labor-saving devices employed, for example, the turret admitting turners, drills, taps and taper turners, the automatic chuck and roller feed permitting the handling of rough stock, and of presenting new lengths and gripping while the machine is running. The planing machines continue to grow in size and speed of cutting, the boring and turning mill finds increasing application, and with hobbing and milling machines ever-growing accuracy is being obtained in gear cutting, which in turn enables the accuracy of other machine tools to be increased. Other and more specialized types of machines exhibited involve equally specialized problems in design—to mention only one which continues to occupy the brainy side of machinists, namely, that of satisfactorily cutting automatically bevel and helical gears.

That the English builders adhere to the long accepted terminology of machine tools is evidenced by the statement in the introduction that "Outside the machine tools other departments of mechanical engineering are well in evidence. For example, punching and shearing machines, woodworking machinery and foundry equipment are well represented."

Also shown were a power plant equipped with the Bone flameless combustion system, gas engines, compressed air plant, hardening and tempering plant, power transmission apparatus and much else of which space forbids mention. About 6000 invitations were sent to merchant importers, government, railroad and municipal engineers and others, representing all countries, while, in addition, half price tickets were sent to engineering societies and technical schools.

Many American firms were represented among the exhibits, among them being the L. S. Starrett Company, Cincinnati Milling Machine Company, Potter & Johnson Machine Company, Warner & Swasey Company, Norton Grinding Company, Cleveland Automatic Machine Company, Cincinnati Bickford Tool Company, Chisholm & Moore Company, Gisholt Machine Company, R. K. LeBlond Machine Tool Company and Lodge & Shipley Machine & Tool Company.

The exhibition was the first of its kind under the auspices of the Machine Tool and Engineering Association, Ltd.

The Steel Corporation's Orders Increase Over a Million Tons

An increase of 1,042,874 tons is shown in the unfilled orders of the United States Steel Corporation by the statement for October 31, published on Saturday. The total was 7,594,381 tons against 6,551,507 tons on September 30. Three previous reports have shown larger totals—7,603,878 tons on June 30, 1907; 8,489,719 tons on December 31, 1906, and 6,809,859 tons on June 30, 1906. But in those two years the Steel Corporation was including intercompany business in its published statements; it also had on its books then a good deal more business of the option sort than at present. The statement is made, therefore, that the figures for October 31 represent the largest total of actual contract business the subsidiary companies have ever had on their books. Below are given the figures for unfilled orders in tons by months, beginning with January, 1911, and at the end and the middle of the years preceding:

October 31, 1912	7,594,381	February 28, 1911	3,400,543
September 30, 1912	6,551,507	January 31, 1911	3,110,919
August 31, 1912	6,163,375	December 31, 1910	2,674,757
July 31, 1912	5,957,079	June 30, 1910	4,257,794
June 30, 1912	5,807,346	December 31, 1909	5,927,031
May 31, 1912	5,750,983	June 30, 1909	4,057,939
April 30, 1912	5,664,885	December 31, 1908	3,603,527
March 31, 1912	5,304,841	June 30, 1908	3,313,876
February 29, 1912	5,454,200	December 31, 1907	4,624,552
January 31, 1912	5,379,721	June 30, 1907	7,603,878
December 31, 1911	5,084,761	December 31, 1906	8,489,719
November 30, 1911	4,141,955	June 30, 1906	6,809,859
October 31, 1911	3,694,328	December 31, 1905	7,605,086
September 30, 1911	3,611,317	June 30, 1905	4,829,655
August 31, 1911	3,584,085	December 31, 1904	4,696,203
July 31, 1911	3,695,985	June 30, 1904	3,192,277
June 30, 1911	3,361,058	December 31, 1903	3,215,123
May 31, 1911	3,113,187	June 30, 1903	4,666,578
April 30, 1911	3,218,704	December 31, 1902	5,347,523
March 31, 1911	3,447,301		

October Copper Production and Stock

The Copper Producers' Association has issued its monthly statement for October, which makes the following showing when compared with September:

	October Pounds.	September. Pounds.
Stock of marketable copper of all kinds on hand at all points in the United States at first of month	63,065,587	46,701,374
Production of marketable copper in the United States from all domestic and foreign sources in the month	145,405,453	140,089,819
Deliveries of marketable copper in the month:		
For domestic consumption	84,104,734	63,460,810
For export	47,621,342	60,264,796
Total deliveries	131,726,076	123,725,606
Stock of marketable copper of all kinds on hand at all points in the United States at close of month	76,744,964	63,065,587

The October production shows an increase as compared with the production in September. Deliveries were higher in October, but fell far short of equaling the increase in production. The net result was an increase of the stock by 13,679,377 lb.

If the talk of tariff reform means anything it means, says the Wall Street Journal, that the importation of foreign goods, at least of certain classes, must be encouraged for the benefit of the consumer. Almost inevitably, however, increased importation of competitive goods would bring in its train the slowing down of certain American mills and reduced employment for certain classes of labor. There is no necessity to predict panic; but there is intellectual dishonesty in pretending that big cuts in prices could be made for the benefit of the consumer and that the American manufacturer and his workingmen would stand by, placid and unharmed.

No. 4 furnace of the National Tube Company at Lorain, Ohio, has resumed blast after being relined and repaired.

September Iron and Steel Exports and Imports

The report of the Bureau of Foreign and Domestic Commerce, Department of Commerce and Labor, for September shows a decrease in the exports of iron and steel, while the imports show an increase in point of value as compared with the figures for August. The total value of the exports of iron and steel and manufactures thereof, not including iron ore, in September was $23,286,040, against $25,450,107 in August, while the value of similar imports was $2,602,795 in September as compared with $2,549,115 in August.

The exports of commodities for which quantities are given total 248,743 gross tons in September, against 282,836 tons in August and 181,150 tons in September, 1911. The details of the exports of such commodities for September and for nine months ended with September, compared with the corresponding periods of the previous year, are as follows:

Exports of Iron and Steel

Commodities	September 1912 Gross tons	September 1911 Gross tons	Nine months 1912 Gross tons	Nine months 1911 Gross tons
Pig iron	21,282	9,947	193,979	95,325
Scrap	5,759	4,416	78,721	60,012
Bar iron	2,996	1,578	16,261	13,879
Wire rods	6,057	1,734	48,180	12,830
Steel bars	21,412	10,919	149,774	93,716
Billets, ingots and blooms, n.e.s.	24,499	19,754	224,746	181,178
*Bolts and nuts	1,633	.....	†5,408	.....
‡Hoops and bands	1,111	534	7,996	†1,589
*Horseshoes	26	.....	†215	.....
Cut nails	399	1,130	7,831	8,286
††Railroad spikes	943	.....	†3,132	.....
Wire nails	4,628	2,096	56,363	35,256
All other nails, including tacks	269	1,073	7,207	9,582
Pipes and pipe fittings	20,046	14,670	192,316	144,818
§Radiators and cast-iron house-heating boilers	739	305	3,806	2,650
Steel rails	40,226	38,210	353,120	349,949
††Galvanized iron sheets and plates	11,739	12,030	†40,128	85,058
††All other iron sheets and plates	2,054		117,805	
††Steel plates	20,571	21,042	¶150,721	167,223
††Steel sheets	10,907		†70,001	
			†28,471	
Structural iron and steel	25,021	16,284	27,345	158,457
Tin and terne plates	6,622	6,462	66,722	42,557
Barbed wire	8,461	8,859	71,413	63,127
All other wire	11,343	10,107	115,822	95,461
Totals	248,743	181,150	2,037,483	1,620,953

*Included in "all other manufactures of iron and steel" prior to July 1, 1912.
†Figures cover period since July 1.
‡Included in "all other manufactures of iron and steel" from July 1, 1910 to June 30, 1911.
††Not separately stated prior to July 1, 1912.
§Included in "all other manufactures of iron and steel" prior to July 1, 1910.
¶Figures are for six months, January to June inclusive.

The imports of commodities for which quantities are given total 18,740 gross tons in September, against 20,572 tons in August and 14,033 tons in September, 1911. Details of such imports for September and for nine months ended with September, compared with the corresponding periods of the previous year, are as follows:

Imports of Iron and Steel

Commodities	September 1912 Gross tons	September 1911 Gross tons	Nine months 1912 Gross tons	Nine months 1911 Gross tons
Pig iron	11,886	7,875	89,557	115,874
Scrap	1,741	948	13,114	14,371
Bar iron	1,344	1,644	18,137	20,839
*Structural iron and steel	290	345	1,874	†626
Billets, bars and steel plates, n.e.s.	1,621	1,879	13,721	23,245
*Steel rails	359	158	2,854	†681
Sheets and plates	191	139	2,631	1,688
Tin and terne plates	207	206	1,502	12,868
Wire rods	1,101	839	10,735	12,128
Totals	18,740	14,033	154,125	202,320

*Included in "all other manufactures of iron and steel" prior to July 1, 1911.
†Figures cover period since July 1.

The imports of iron ore in September were 180,571 gross tons, against 178,828 tons in August and 184,456 tons in the month of September, 1911. The total importations of iron ore for nine months ended with September were 1,539,452 gross tons, against 1,362,352 tons in the corresponding period of 1911.

The total value of the exports of iron and steel and manufactures thereof, not including iron ore, for nine months ended with September, was $213,699,572, against $178,988,598 in the corresponding period of 1911. The total value of the imports of iron and steel and manufactures thereof, not including iron ore, for nine months ended with September, was $21,111,860, against $22,220,521 in the corresponding period of 1911.

Customs Decisions

Iron Sheets and Steel Strips

The Board of United States General Appraisers has overruled protests filed by L. C. Hirsch & Co. and Oelrichs & Co. involving the classification under the tariff act of 1909 of iron sheets and steel strips, enameled, coated, etc., used in the manufacture of buttons. The sheets have been enameled or lacquered on one side with an enamel or coating, either painted on, stamped or embossed, and show a mottled design in blue and white. A third class of merchandise consists of strips of steel coated on one or both sides with nickel. The iron sheets measure 21 by 30 in., while the strips are 1 in. in width and 200 ft. in length. Duty was assessed at the rate of 25 per cent. ad valorem under the provisions of paragraph 199, as "manufactures of metal not specially provided for." The importers claimed that the iron sheets are properly dutiable at 30 per cent. under the provisions of paragraph 127 and the steel strips under paragraph 124 or 135 at 35 per cent. The additional claim was made that the strips are subject to the additional rate of two-tenths of 1c. per lb. for the nickel coating as provided in paragraph 128. It was not shown at the hearings that coated sheets of the character of the goods in controversy would be properly denominated as "sheets of iron or steel, common or black."

Judge Fischer, in his decision overruling the claims, holds that the change in the condition of the original sheets has converted them into articles adapted for special use and has thus unfitted the merchandise for the general purposes to which common or black sheets are adapted. Therefore the sheets do not answer to the description "common or black" as used in paragraph 127, under which claim is made for lower duty by the importers. It is held that the steel strips on which protest is made are something more than the strips referred to in either paragraph 124 or 135. The collector's assessment on all of the importations is affirmed.

Iron Melting Pots

The Board of United States General Appraisers has overruled a protest filed by the Roessler & Hasslacher Chemical Company regarding the classification of iron melting pots under the tariff act of 1909. They were returned for duty at 45 per cent. ad valorem under the metal schedule and were claimed to be dutiable at 30 per cent. under paragraph 151 as "cylindrical tubular tanks or vessels." Judge Fischer denies that the articles are containers and affirms the collector's assessment.

Grinding Machines

The board has sustained a claim filed by Leigh & Butler regarding the classification of so-called Dronsfield's grinding machines used for grinding calendar bowls. They were assessed with duty at 45 per cent. under paragraph 199, tariff act of 1909, as manufactures of metal, and were claimed to be dutiable at 30 per cent. under paragraph 197 as machine tools. It was shown to the satisfaction of the board that the machines in question are metalworking power-driven mechanisms. Under these circumstances the collector's classification under the higher rate is reversed.

Recent Licenses for Iron Ore Sintering

The United States Steel Corporation has taken a license for the sintering process of the American Ore Reclamation Company, 71 Broadway, New York, for itself and its subsidiary companies. The initial installation of two machines will be made immediately at the Central furnaces of the American Steel & Wire Company at Cleveland, and these will be used for the sintering of flue dust. Plans are now being prepared for this installation.

The Toledo Furnace Company has also taken a license from the American Ore Reclamation Company for the Dwight and Lloyd process for the sintering of flue dust, and plans are being prepared for two machines, which will be installed at once at the company's two furnaces at Toledo, Ohio.

Pittsburgh and Vicinity Business Notes

The report that the Sharon Steel Hoop Company, Sharon, Pa., had compromised with its striking electrical workers and had given them an advance in wages is incorrect. There was no compromise of any kind, but the men returned to work on the terms of the company as far as vacancies existed at the time the men declared the strike off. Some of the places had been filled before that time, which resulted in the loss of positions to a number of the striking employees.

All the larger holders except one of the notes of the Westinghouse Machine Company, East Pittsburgh, have assented to the plan of exchanging these notes for bonds of the company.

The Pittsburgh & Lake Erie Railroad will shortly experiment with the new gasoline-electric motor car which it has purchased from the General Electric Company. The car is run by electricity generated by a gasoline motor in the front of the car. A trailer will be attached which will seat 65 passengers.

The Bessemer Gas Engine Company, Grove City, Pa., will erect a new power plant in which 700 hp. of Bessemer gas engines will be installed, direct connected to generators to supply power for the machine shop. It has just installed two 24-in. Cincinnati drill presses, one 72-in. Sellers radial drill, one 30-in. Gisholt turret lathe, one Gould & Eberhardt automatic gear cutter, a Sellers universal tool grinding machine and a Sellers drill grinder.

The American Steel Cross Arm Company, Pittsburgh, has applied for a charter of incorporation with a capital stock of $300,000. The new company is understood to contemplate the erection of a factory. H. G. McCutcheon and W. H. Anchor, of Pittsburgh, are named among the incorporators.

The Cambria Steel Company, Johnstown, Pa., has ordered two six-wheel switching locomotives, of large type, from the American Locomotive Company. The cylinders will be 21 x 26 in., the driving wheels 50 in. in diameter, and each engine will weigh 145,000 lbs. The company has also ordered a new magnet crane of 10-ton capacity, which will be installed by the first of the year.

The Mesta Machine Company, Pittsburgh, has received an order from the Alpha Portland Cement Company, Cementon, N. Y., for three gas engines direct connected to 600 kw. alternating current generators. These engines are to operate on producer gas.

The Westinghouse Electric & Mfg. Company, East Pittsburgh, has leased the first floor of the large building of the Bindley Hardware Company at Shadyside Station on the Pennsylvania Railroad in Pittsburgh, and is installing the necessary equipment to make automobile accessories, including the Westinghouse air spring. Operations will be commenced in two or three weeks and employment will be given to about 200 hands.

Charles T. Topping, Bessemer Building, Pittsburgh, has been appointed representative in the Pittsburgh territory for the following lines: Koehring concrete mixers, Weimer industrial cars and railroad, Standard combination woodworkers, Symons column clamps and New York flexible hose. In addition he handles hoisting engines, rock and ore crushers, steam engines and boilers, buckets, etc.

National Founders' Association Meeting Next Week

Papers are announced as follows for the meeting of the National Founders' Association in the Hotel Astor, New York City, November 20 and 21: "Standardization of Safety Appliances for Foundry Employees," by M. W. Alexander, General Electric Company, Lynn, Mass.; "Practical Efficiency," by Staunton B. Peck, Link-Belt Company, Chicago; "Fire Prevention and Fire Insurance for Foundries," by Franklin H. Wentworth, Boston: "What Is Doing in Workmen's Compensation," by G. W. Mixter, Moline, Ill., and Miles Dawson, New York.

Among the topics scheduled for discussion are: "Influence of Organized Labor on Legislation," "The Eight-Hour Day on Government Work," "Business Men to Washington—Why?" and "Investigation by Government as Contemplated Through Committee on Industrial Relations."

Philadelphia Foundrymen's Association

The Philadelphia Foundrymen's Association held its 222d meeting at the Hotel Walton on the evening of November 6. It was by far the largest meeting of the association that has been held for a number of years, upward of 250 being in attendance. This large gathering was due to the interesting programme prepared for the evening, which covered the motion picture exhibit of Rogers, Brown & Co., covering the entire cycle of the iron industry from the mining of the ore, transportation on the Great Lakes, handling of the ore at the docks, blast furnace practice, including the casting of pig iron in sand beds and by machine, to the operation of the Bessemer converter and the fabrication of steel rails and sheet piling. This was given under the personal direction of H. B. B. Yergason of Rogers, Brown & Co.

The only business of importance transacted at this meeting was the nomination of officers for the coming year. A Nominating Committee composed of A. A. Miller, of *The Iron Age;* George C. Davies, of Pilling & Crane, and C. D. Mathews, Camden Iron Works, recommended the re-election of the present officers, as follows: President, Thomas Devlin, Thomas Devlin Mfg. Company, Philadelphia; vice-president, E. E. Brown, E. E. Brown & Co., Philadelphia; treasurer, Josiah Thompson, J. Thompson & Co., Philadelphia; secretary, Howard Evans, J. W. Paxson Company, Philadelphia. Executive Committee—Walter Wood, R. D. Wood & Co.; Thomas M. Eynon, Eynon-Evans Mfg. Company; H. L. Haldeman Pulaski Iron Company, and Walter T. MacDonald, Schaum & Uhlinger Company, all of Philadelphia, and Walter S. Bickley, Penn Steel Casting & Machine Company, Chester, Pa. Trustees—Thomas Devlin, Josiah Thompson and Howard Evans. Official chemist—George C. Davis, Philadelphia.

Sections of the American Society of Mechanical Engineers have been organized in Cincinnati and Chicago. The committee in Cincinnati is as follows: Adolph L. De Leeuw, mechanical engineer Cincinnati Milling Machine Company, chairman; Prof. John T. Faig, University of Cincinnati, secretary; Walter G. Franz, consulting engineer; George W. Galbraith, sales manager International Steam Pump Company, and L. H. Thullen, chief engineer Triumph Electric Company. The Chicago committee is as follows: Paul P. Bird, Commonwealth Edison Company; Henry A. Bogardus, president and treasurer Bogardus Company; Prof. George F. Gebhardt, Armour Institute of Technology, and Arthur L. Rice, managing editor The Practical Engineer.

Labor difficulties at the sheet mills of the Alan Wood Iron & Steel Company and the J. Wood & Bros. Company at Conshohocken, Pa., have been adjusted. The puddling scale was voluntarily increased to $4.75 per ton. The other employees demanded an advance of 10 per cent., which, after conferences between employers and men, was granted. The mills were idle for several days.

Wages of puddlers in bar iron mills that sign the Amalgamated Association scale for November and December will be based on a 1.30c. card and will be $6.15 per ton. The rate paid in September and October was $6 and in July and August $5.85. The Sons of Vulcan puddlers work on a flat rate of $6 a ton.

At Erie, Pa., manufacturing plants are paying laborers $2.50 per day, and at several northern Pennsylvania points the railroad companies are offering $2.35 per day for labor.

No. 1 Crane furnace, of the Empire Steel & Iron Company, Catasauqua, Pa., which has been idle for about two months for repairs, was blown in last week.

A 188-page report on testing power plant apparatus appears in the American Society of Mechanical Engineers' Journal.

Tod furnace of the Brier Hill Steel Company at Youngstown, Ohio, has been blown out for relining.

The Machinery Markets

The machinery trade generally is not worrying over any probable results of the approaching change in administration. That there would be a change had been expected by a large part of the industry and discounted accordingly. "We're going right ahead," would be a fitting slogan of the prevailing sentiment. The New York trade in the last week has continued to have a fair run of miscellaneous business and good prospects are still pending. Small propositions in good volume prevail in Philadelphia and there, also, prospective trade is encouraging. New England is free from political fears, the hardware trade was never so prosperous, the brass mills are rushed, machine tool builders are busy and the only fault found is with the shortage of labor. In Detroit a little slackening up is noted, but the lull does not include power equipment and the indications are that it will be shortlived. Chicago machine tool dealers have had a good week, the day following election having been one of the best both as regards sales and inquiries. The International Harvester Company was a heavy buyer. Trade has been good in Cleveland, especially in single tools, and some plants located there have more orders on hand than ever before. An indication of trade activity in Cincinnati is the fact that jobbing founders are operating at about 90 per cent. of their capacity. Conditions have been a little quieter in St. Louis, but greater activity at an early date is confidently looked for. The machinery trade is generally good in the Central South. The demand for pumping machinery in Birmingham is much better than that of a year ago and the demand for mining equipment is excellent. Trade conditions are booming in every part of Texas. On the Pacific coast machinery market conditions are a little quieter.

New York

NEW YORK, November 13, 1912.

Although there is at present an absence of big propositions in the New York market there is a good run of miscellaneous business and some excellent prospects are pending. The latter, among which may be classed the anticipated Baltimore & Ohio Railroad list, which has been in preparation for some months, seem slow in becoming actualities before the trade, but it is not believed they can be held off much longer. That business is going right ahead despite the approach of a new administration is the general sentiment. On the afternoon before election day the Baldwin Locomotive Works closed an order for an $8000 forging machine. An indication of good business conditions is the trend toward large machine tools. Heavy lathes have been in demand with paper mills, coal mines and street railways for repair purposes. The Simms Magneto Company, Bloomfield, N. J., now under new management, as noted heretofore, is in the market for 20 turret lathes, and the Western Maryland Railway Company has an inquiry out from Hagerstown for two machines of the same kind. The Pennsylvania Railroad is inquiring for a motor-driven turret lathe designed to take 6-in. bar stock for turning out cross-head pins and other large locomotive work.

The Vulcan Detinning Company, 114 Liberty street, New York, suffered a loss by fire November 8 of part of its plant at Sewaren, near Perth Amboy, N. J. The extent of the damage to its equipment, which is all of a special character, is not yet determined, but its power plant is intact. The plant is an extensive one covering about six acres and will be replaced as soon as possible.

The National Box & Lumber Company, Newark, N. J., has had plans prepared for the erection of a planing mill, 45 x 100 ft., two stories, of frame construction, at 354 South street. Frank Grad is the architect.

William Sherwood, Canastota, N. Y., has plans for a factory for the manufacture of metal screens which he will erect early next spring.

The Continental Can Company, Syracuse, N. Y., has let contracts for a factory addition, 100 x 235 ft., one and two stories, to be erected at its plant on East Water street, brick and steel construction. A warehouse will also be erected.

The Van Brocklin Glove Company, Amsterdam, N. Y., formerly located at Northville, N. Y., has leased the plant on Spring street, formerly occupied by Baird Bros. and will at once remodel and equip it for the manufacture of leather gloves.

The Bartlett All-Steel Scythe Company, Inc., Geneva, N. Y., has filed articles of incorporation with a capital stock of $50,000 and will establish a plant in that city for the manufacture of scythes and other implements. M. M. Bartlett, G. G. Goodelle and A. L. Allegretti, Geneva, are the incorporators.

The National Oil Gas Heating Company, Rochester, has been incorporated with a capital stock of $25,000 by A. C. Lamay, C. C. Shannon and C. C. Gibbs, of that city, to manufacture oil, gas burners, etc., and a plant will be arranged for.

The McKaig Drop Forge Company, Buffalo, N. Y., has been incorporated with a capital stock of $50,000 to take over and continue the business of a partnership of the same name, manufacturers of small drop forgings, pliers, wrenches, etc., at Perry and Washington streets. It is the intention of the company to erect later on a new plant with railroad switch facilities for which a site has been purchased. The incorporators are W. W. Dickinson, J. O. Herbold and E. McM. Mills. Officers have not yet been elected. John McKaig will continue as manager.

The Republic Metalware Company, Buffalo, is having plans prepared for a further addition to its plant at Republic street and the Erie Railroad.

The Washburn-Crosby Company, Buffalo, has completed plans for extensive additions to be made to its plant. The additions will consist of an elevator, storage warehouses of concrete and steel having a capacity of 2,000,000 bushels of wheat, and a working house. When the new buildings are completed the plant will have a capacity of 15,000 barrels of flour per day, making it one of the largest flour mills in the United States.

The Barcalo Mfg. Company, Buffalo, is having plans prepared for an addition to its plant for the manufacture of brass and iron beds at Tecumseh and Republic streets and the Erie Railroad.

New England

BOSTON, MASS., November 12, 1912.

The election has caused hardly a ripple of excitement, as far as any effect on business is concerned. The only expressed apprehension is that actions of too radical an administration might affect prosperity, but there are few who believe that any danger exists from this source.

The hardware industry of Connecticut was never so prosperous. The American Hardware Corporation, New Britain, is doing by far the greatest business in its history, and the same report comes from practically all other manufacturers in this trade. The brass mills are simply booming. The machine business continues to improve. The only complaint thus far expressed is the inability to secure workmen.

Apparently machine tool prices are soon to advance. The talk is strong that present conditions as to prices of labor and materials, coupled with the fact that machinery has been improved in important ways, increasing its cost in the past few years, make it imperative that the manufacturer receive a larger return from his customers. The constantly increasing demand is another factor in inducing the movement upward.

The American Hardware Corporation, New Britain, Conn., has purchased the entire stock of the Universal Machine Screw Company, Hartford, Conn. It is not the intention to merge the latter company in the larger corporation, which will act as a holding company. The Hartford plant will be maintained at its present location. The Universal Company will cease to build its multi-splindle automatic screw machines for the market, but the manufacture of screw machine products will continue as heretofore and on a large scale. The works will be auxiliary to the business of the Corbin Screw Corporation, which is an important unit of the American Hardware Corporation. Clarence A. Earl, general manager of the Corbin Screw Corporation, is the president of the Universal Company, and F. Good-

win Smith is the secretary and treasurer and general manager, offices which he held with the company previous to the change in ownership. The purpose is to increase the manufacturing capacity of the works as rapidly as possible, in order to meet the demands of the present market. The Universal Machine Screw Company began business on a commercial basis about six years ago. A reorganization was effected two years ago, with Charles Phelps as president, Thomas W. Russell vice-president and F. Goodwin Smith secretary and treasurer. About the same time the present modern plant was erected in the northerly part of Hartford, on the tracks of the New York, New Haven & Hartford railroad. The business has since grown rapidly, both in screw machine products and in the machines themselves, which latter, however, will not hereafter be available to the trade. The industry, already large, will be one of much greater importance when the contemplated immediate increase in plant is effected.

The Automatic Machine Company, Bridgeport, Conn., manufacturer of machinery and combustion engines, is erecting a two-story storage building, the first floor of which will be used for raw material, the upper for finished product. The increase in space is due to the heavy increase in the company's business, the volume being approximately 35 per cent. more than that of a year ago. No equipment will be needed for the new building.

Control of the stock of the Midletown Electric Light Company, Middletown, Conn., has been acquired by Stone & Webster, Boston. The company recently erected a large electric generating plant.

Charles Ams, Mount Vernon, N. Y., has purchased the village of Turnersville, Conn., including two factories.

The Norwich Nickel & Brass Company, Norwich, Conn., will erect an additional foundry 40 x 100 ft., one story, of brick, with concrete floor and monitor roof.

Additions to general manufacturing facilities of New England include the Viscoloid Company, Leominster, Mass., one-story mill, 40 x 140 ft.; Springfield Rendering Company, Springfield, Mass., four-story brick and reinforced concrete building, 47 x 152 ft.

In addition to the new buildings of the Crane Valve Company, Bridgeport, Conn., recently announced, the Company will erect a structure which will be given over to the department of employment, and will contain an employment office, hospital quarters, physician's room, ambulance room, dining room and kitchen.

Interests identical with the Hobbs Mfg. Company, Worcester, Mass., have secured the control of the American Stamp & Ticket Vending Machine Company of New York, which will manufacture automatic selling devices having as an inherent feature an automatic coin detector, which rejects all but the coins which it is intended to accept, including any form of counterfeit or imitation. At the head of the corporation will be President Clarence W. Hobbs and Treasurer Harry W. Goddard of the Hobbs Mfg. Company, Mr. Goddard being also the head of the Spencer Wire Company of Worcester. He is president of the new company and Curt Wollheim is the treasurer. The company plans to manufacture on a large scale in the future in works to be erected for the purpose. For the present the Hobbs Mfg. Company will take care of the product in its shops, where the development of the machine has been carried to perfection in the last two years.

Philadelphia

PHILADELPHIA, PA., November 12, 1912.

Transactions in the local market have been unimportant, but a very good volume of business is pending. The opinion prevails that the recent election will have little effect on the general business situation, and that, with the great activity of industrial plants, particularly in the metal lines, increased purchases of machinery equipment must ultimately be made. Machinery and tool builders are actively engaged, and complaint of delayed deliveries, owing to the inability to obtain prompt shipments of raw materials, is almost universal. Makers of gray iron and steel castings are steadily becoming more actively engaged and deliveries are less prompt. Railroad buying of machine tool equipment is still at low water mark. A fair business is moving in second-hand equipment, including machinery, tools, boilers and engines. Export demand has been quiet.

Fire damaged the grinding room of the Victor Talking Machine Company, Camden, N. J., last week. Damage to the building and machinery was unimportant.

The incorporation of the Locomotive Super Heater Company, Wilmington, Delaware, with a capital stock of $2,500,000, under Delaware laws, is announced. The company plans to acquire patents for boilers, engines and other machinery. The incorporators named are E. E. McWhiney, Norman J. Coffin and W. J. Maloney, all of Wilmington, Del.

The Transit Commission of the city of Philadelphia has informally approved proposed elevated transportation lines from Market street to Frankford by way of Second street, and to Darby by way of Thirty-second street and Woodland avenue.

The Penn Rivet Mfg. Company, Eleventh and Cambria streets, will hold a special meeting of its stockholders December 30, to decide upon an increase in its capital stock of $150,000 to $[illegible]00,000.

The Highlandtown Ice Company, Baltimore, Md., is planning to erect a new plant on the site of its present buildings at Canton avenue and First street. The new buildings include boiler rooms, engine rooms, tank and storage rooms and refrigerating buildings. All the buildings are to be one story on concrete foundations.

J. O. Clarke, engineer, Franklin Building, has received bids for additions to the plant of the MacAndrew & Forbes Company, Camden, N. J. These include two brick and steel one-story buildings, 63 x 84 and 46 x 65 ft., to be used in the manufacture of licorice products. The equipment required will be entirely of a special nature.

The Haines Gas Turbine Company has been incorporated under the laws of Delaware with a capital stock of $1,000,000. H. Ralph Ewart, Wilmington, Del., is named as an incorporator.

The Reading Crane & Hoist Works, Reading, Pa., advises that the volume of its business has increased about 50 per cent. over that of four to six months ago. The plant is being operated at full capacity.

The Ferracute Machine Company, Bridgeton, N. J., states that business in the past four or five months has probably been better than any previous similar period since it has been in business. Improvement is noted both in the number and value of orders.

Chicago

CHICAGO, ILL., November 12, 1912.

The volume of business in machine tools done in this market last week was the largest in several weeks. The election was seemingly not considered by buyers. The day following the election produced the greatest number of inquiries and sales of the week, a large concern reports. Inquiries are followed quickly by sales and shipping instructions are for the earliest possible delivery. The Illinois Central Railroad, which closed for $18,000 worth of machine tools recently, has ordered them shipped to its shops at Centralia, Mo. The International Harvester Company bought several thousand dollars' worth of machine tools last week; a shop at Moline, Ill., bought about $4000 worth; a 54-in. boring mill was shipped to a buyer in Wisconsin; a heavy duty drilling and tapping machine went to a railroad in Michigan, and Central Illinois factories bought a large quantity of tools. New inquiry was especially good in Michigan, Wisconsin and Illinois.

The Tousey Varnish Company, through Postle & Fisher, 140 South Dearborn street, Chicago, is taking bids on a two-story factory building, to be of pressed brick with concrete floors.

A. M. Castle & Co., 217 North Jefferson street, Chicago, have let the contracts for a brick factory building to be erected at 1300 North Branch street, at a cost of $60,000. New machinery will be installed.

The Chicago Bearing Metal Company, 332 South Michigan avenue, Chicago, is about to erect a $200,000 plant on a tract of land which it has just acquired on Forty-third street. The proposed plant will be of fireproof construction and is to be used for the manufacture of brass goods.

The Streeter Supply Company, Chicago, has been organized with a capital stock of $10,000, to manufacture and deal in railroad supplies. The incorporators are A. L. Streeter, George C. Marsh and John Hyland.

The Rumsey Car Door & Equipment Company, Chicago, has been incorporated by J. W. Rumsey, Oscar Hogin and W. H. Sheasby, to manufacture and deal in car doors, machinery and railway equipment.

The Firestone Steel Foundry Company, Chicago, has increased its capital stock from $10,000 to $50,000.

The Allen's Nut Lock Company, Chicago, has been incorporated with a capital stock of $300,000 by Oglesby Allen, Jr., Roger J. Marcy and Andrew J. O'Donnell.

The Quincy Electric Supply Company, Quincy, Ill., has been organized with a capital stock of $6000. The incorporators are F. L. Havervale, Frank J. Pennick and J. M. Winters.

The Emerson-Brantingham Company, Rockford, Ill., will erect a branch factory at Fargo, N. D. The building will be 80 x 240 ft., four stories and of concrete construction.

The Chicago, Milwaukee & St. Paul Railroad is preparing plans for the erection of a new terminal at Bensonville, Ill., which will include a roundhouse, power house, storehouse and machinery and blacksmith shop.

The Pettigrew Foundry Company, Harvey, Ill., with $75,000 capital stock, has been incorporated by Frederick R. De Young, George A. Miller and Albert H. Roesler.

The Stark County Power Company, Wyoming, Ill., with $20,000 capital stock, has been incorporated to equip a public utility plant. The incorporators are Edwin B. and A. D. Hillman and Edgar P. Reeder.

The Power Washing Machine Company, Peoria, Ill., with $25,000 capital stock, has been incorporated by Charles W. LaPorte, Hiram E. Todd and George T. Bean to equip a plant for the manufacture of washing machines.

The Prest-o-lite Company, Indianapolis, Ind., is considering the establishment of a branch office at Davenport, Iowa. A site has already been purchased upon which the company will erect a plant.

The Willmar Machine & Foundry Company, Willmar, Minn., has been incorporated with a capital stock of $10,000, by Gilbert Amonsen, Henry Amonsen and J. Emil Nelson.

The Two Rivers Plating Company, Two Rivers, Wis., was awarded a contract for two large additions to its factory.

The Sterling Machinery Company, La Crosse, Wis., has been incorporated with a capital stock of $25,000. Plans for a new building have been drawn and brick-making machines will be manufactured. Officers are as follows: President, E. E. Wege; vice-president, Herman Fisher, and secretary, A. Hynne.

The J. I. Case Threshing Machine Company, Racine, Wis., is planning the erection of a new plant covering 10 acres of ground and costing approximately $2,000,000.

The city of La Crosse, Wis., will open bids November 20, through the Board of Public Works, for the construction of a pumping station, five substations, a disposal plant, two reservoirs, five centrifugal pumps and a pumping engine of 8,000,000 gal. capacity.

Detroit

DETROIT, MICH., November 12, 1912.

The demand for machinery in the local market has slackened somewhat in the past week and most dealers report less activity than for some time. Business in prospect is attractive and gives rise to the expression of belief that the present dullness will be for a short period only. Relatively the upstate market is productive of more inquiries than the city. A bright feature of the market has been the strong demand for boilers; engines also have been in fair request. Second-hand machinery is holding its own, with sales covering general lines of wood and metal working tools. The foundry trade continues active with a heavy demand for both iron and steel castings. Little new work is in sight in building circles and it looks as though the winter dullness in this field was setting in remarkably early in the season.

The recently organized Peninsular Steel Castings Company, Detroit, has completed the equipment of its new plant at Iron and Wight streets, and now has it in full operation. The company manufactures castings by the crucible process.

The Trippensee Mfg. Company, Detroit, manufacturer of wooden specialties, has awarded the contract for the erection of a new two-story factory building to cost about $10,000.

The Frank Bros. Iron & Metal Company, Detroit, smelters, is completing a new factory building on Orleans street.

The Department of Public Works, Detroit, has commenced the erection of an addition to the city asphalt plant which will double its capacity. J. J. Haarer is commissioner.

The Farlinger Mfg. Company, Detroit, has been incorporated with a capital stock of $30,000 by Morris Friedburg, Charles R. Talbot, William H. Arthur and others. The company will engage in the manufacture of automobile accessories and will also do a general metal stamping, die and tool business.

The Sanitary Package Company, Kalamazoo, Mich., has been incorporated with a capital stock of $30,000, to manufacture berry boxes and other fruit packages. The incorporators are Howard M. Jordan, Hugh E. Agnew and A. A. Morse. Automatic machinery will be installed.

The Steel Furniture Company, Grand Rapids, Mich., has taken out a permit for the erection of a two-story factory building. The company, which has a capital stock of $35,000, manufactures a line of steel school furniture. E. S. Irwin is general manager.

The J. H. Smith Company, Rochester, N. Y., has purchased the plant of the Lawton Fruit Juice Company, at Lawton, Mich., and will materially enlarge its capacity. The Smith Company has incorporated under Michigan laws, with $100,000 capital stock.

The plant of the defunct Muskegon Steel Castings Company, Muskegon, Mich., was sold at receiver's sale November 4 to W. E. Jeannot. Mr. Jeannot has organized a new company to be known as the West Michigan Steel Foundry Company, with a capital stock of $15,000, and will engage in the foundry business.

The Jackson-Church Company, Saginaw, Mich., manufacturer of boilers, engines and special machinery, has begun the construction of a considerable addition to its plant.

The Warne-Douglas Company, Bronson, Mich., maker of sheet metal stampings, etc., has filed notice of an increase of capital stock from $15,000 to $30,000.

Mt. Clemens, Mich., is considering the purchase of six centrepetal electric pumps as an auxiliary to the present pumping equipment at the water works. Herman Orbits is superintendent.

L. N. Beaker, Detroit, has purchased the interior finish and flooring mill of DeCaussin & Susick in this city and will remodel it and install a considerable amount of new machinery.

The taxpayers of Ecorse, Mich., have voted in favor of a bond issue of $12,000, for the purpose of extending the water works system.

Dispatches from Muskegon, Mich., state that George Latimer and associates will engage in the manufacture of wrapped wire. It is stated that the company will occupy the factory of the Motor Specialty Company.

The William Shakspeare, Jr., Sporting Goods Company, Kalamazoo, Mich., has completed plans for the erection of a new factory and office building. The structure will cost about $30,000 and will have a floor space of 35,000 sq. ft., permitting the company to considerably increase its capacity.

The plant of the Clio Mfg. Company, Clio, Mich., manufacturer of furniture specialties, was damaged by fire November 5 to the extent of $10,000.

The Gibson Mandolin & Guitar Company, Kalamazoo, Mich., has outgrown its present plant and has begun the erection of a new factory to cost about $20,000.

The Michigan Buggy Company, Kalamazoo, Mich., is erecting an addition, 50 x 180 ft., three stories, to its plant which will be devoted exclusively to its automobile manufacturing department and its buggy factory will be extended into the building made vacant by the removal of the automobile department.

Cleveland

CLEVELAND, OHIO, November 12, 1912.

Machinery houses are doing a good volume of business in single tools, although orders are not quite so numerous as last month. Orders taken in the week include a good run of two or three tool lots, but few for a larger number of tools. No inquiries come out for round lots. Business is coming from well scattered sources. In general machinery there is a heavy demand for practically all lines and particularly in the line of small handling equipment. A large number of orders for small gas producers are coming from various sources and in addition there is a good demand from steel plants. The demand from mine hoists is excellent. Manufacturers in metal working lines report no falling off in the good volume of orders and plants, generally, are running at full capacity. Some have more work on hand than ever before. This condition is necessitating the placing of orders for additional machinery. The demand for second-hand machinery is quieting down somewhat. The foundry trade continues very active and many plants are crowded to make deliveries of castings.

The General Electric Company has awarded a contract to the Samuel Austin & Son Company. Cleve-

land, for a building 80 x 290 ft., three stories, of brick and mill construction, to be erected on the company's site on East 152d street, Cleveland. It will be used in connection with the company's lamp manufacturing business. The contract also calls for a power plant and gas producer building to be erected on the same site.

The Cleveland Magnetic Chuck Company is the name of a new concern that is placing on the market a line of flat, vertical, rotary and swivel magnetic chucks. The company is located at 946 West avenue, N. W., Cleveland, Ohio.

The Twin City Ice Company, Dennison, Ohio, has been incorporated with a capital stock of $25,000 and will build an ice manufacturing plant.

The city of Cleveland is in the market for Venturi meters for the fire service pump station of the water department. Bids for these will be received November 18.

The American Multigraph Company, Cleveland, has commenced the erection of a six-story addition to its plant.

The Lewis Electric Welding & Mfg. Company, Toledo, Ohio, will add a gray iron foundry to its plant and will add a department for making gray iron piston rings. A building 120 x 120 ft. will be added to the present plant.

The Star Drilling Machine Company, Akron, Ohio, has increased its capital stock from $500,000 to $1,000,000.

F. S. Rathwell, Lorain, Ohio, is planning the erection of a large garage.

The Village Council of Clyde, Ohio, has sold $30,000 in bonds to reconstruct the municipal water works and electric light plants.

Cincinnati

CINCINNATI, OHIO, November 12, 1912.

Conditions with machine tool builders are somewhat irregular. Several local firms report both inquiries and orders for single tools as being very encouraging, while others state that business is very slow. The railroads are doing little buying just now, despite the fact that there are a number of old lists out, but orders from this source are expected to develop before the end of the year.

Second-hand machinery continues in poor demand, although there are a few orders to be noted from Southern territory. Gas engine manufacturers are all busy, and the outlook is excellent. Conditions with the jobbing foundries are unchanged, and they are operating very close to 90 per cent. of capacity.

The Goldsmith Metal Lath Company, Cincinnati, has leased the former plant of the Cordesman & Meyer Company on Central avenue, and will install the necessary machinery for manufacturing a metal lath.

The Modern Machine Tool Company, Winton place, Cincinnati, has recentlv installed several machine tools, and will probably further add to its manufacturing facilities later on.

The Allen & Dean Roller Coaster Company, Ironton, Ohio, is buying machinery to re-equip its plant recently destroyed by fire.

The P. J. Sorg Paper Company, Middletown, Ohio, has tentative plans under way for a large addition to its plant for which considerable machinery equipment will be required.

The Streit Machinery Company, Cincinnati, household specialty manufacturer, has sold its plant on Marquis street, to the Park Laundry Company. The new company will probably install a few small electric motors.

A large refrigerating plant will be erected at Springfield, Ohio, for Swift & Co., Chicago. The Morningstar-McIntire Construction Company, Springfield, has been awarded contract for the building.

F. L. Packard, architect, Columbus, Ohio, is preparing plans for remodeling the old plant of the Columbus Machine Company, for the Kroger Grocery & Baking Company. A small amount of special equipment will be required.

The Perfection Spring Company, Mansfield, Ohio, is moving into more commodious quarters and is buying some new equipment.

The Kay & Ess Paint Company, Dayton, Ohio, is erecting a four-story factory building for which an automatic sprinkler system will be required.

The Krein Chain Company, Wapakoneta, Ohio, is making an addition to its plant that will be 40 x 50 ft., one story and of mill construction. Nothing is known as to the machinery requirements.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., is making some improvements to its plant, included in which is the construction of a large pattern shop.

The Hocking Valley Mfg. Company, Lancaster, Ohio, is having plans prepared for a foundry building that will be 60 x 140 ft., one story and of brick construction. D. Riebel & Sons, Columbus, Ohio, are drawing up the plans.

The Tenacity Mfg. Company, formerly in the Murdock Building, Cincinnati, is moving its plant to Reading, Ohio, and will be in the market for a small amount of equipment. The company manufactures metal specialties.

Indianapolis

INDIANAPOLIS, IND., November 12, 1912.

The Hunter-Hammond Auto Company, Indianapolis, has been organized, with $12,000 capital stock, to manufacture automobiles and accessories. The directors are F. Ellis Hunter, Harry L. Hammond and John S. Berryhill.

The Brown County Development Company, Indianapolis, has been incorporated with $50,000 capital stock, to develop oil and gas in Brown County, Ind. The directors are George W. Bruce, J. C. Billheimer and H. S. Cone.

The Hercules Gas Engine Company, Evansville, Ind., has been incorporated with $10,000 capital stock, to manufacture engines. The directors are W. H. McCurdy, F. M. Hillis and J. D. Craft.

The American Pipe Organ Company, Anderson, Ind., has been incorporated with $10,000 capital stock. The company will manufacture organs and electrical devices to supply power for pipe organs. Frank East and Hart Sommers are the principal promoters.

The plant of the Summitville Tile Company, Summitville, Ind., was burned November 5, with a loss of $40,000.

The Vacuum Ice Machine Company, South Bend, Ind., has been incorporated with $25,000 capital stock, to manufacture ice machines. The directors are H. F. Willis, G. H. Alexander and William F. Eger.

The Standard Match Company, Terre Haute, Ind., has given preliminary notice of dissolution.

The M. Rumely Company, LaPorte, Ind., manufacturer of tractor engines, has lately completed a large addition to its plant, for which a number of machine tools were required, and it is rumored further extensions are contemplated in the near future.

The Wayne Works, Richmond, Ind., is buying machine tools and other equipment for an automobile factory.

The Federal Motor Works, Indianapolis, will erect a factory building on Fifteenth street at a cost of $25,000. The building will be 50 x 450 ft., one story, of sawtooth construction.

The New Albany Veneering Company, New Albany, Ind., will be in the market shortly for glue-room equipment for an addition to its panel plant, including spreaders, presses, etc. E. V. Knight is president of the company.

The Central South

LOUISVILLE, KY., November 12, 1912.

Business in most lines is reported from fair to very good, with a considerable volume of small orders. Local manufacturers of ice machinery state that they have numerous orders from the South, contingent on the improvement of financial conditions after the completion of the cotton movement. Structural steel concerns are still complaining of inability to get adequate supplies of material from the mills by reason of the crowded conditions existing, as many mills are reported to be several months behind. Some of these concerns have purchased supplies for immediate necessities from warehouse stocks in Chicago, at advanced prices.

The Universal Swing Joint Company, Louisville, which recently took over the plant of the Kentucky Gear & Machine Company, 901-905 West Jefferson street, and will manufacture flexible steam joints, will soon be in the market for special machinery for use in the company's plant. John Bridges has been appointed superintendent by the new company.

Harding, Ky., will install a small lighting plant. A 5-kw dynamo is among the machinery wanted. The mayor should be addressed.

The Viscosity Ice Machine Company, Louisville, has been organized for the purpose of manufacturing ice machinery under a new patent. It will also probably

manufacture ice, although no definite plans have been decided. The incorporators are C. L. Holder, D. L. Holder and J. G. A. Schuster, all of Louisville.

It is reported at Russell, Ky., that the Chesapeake & Ohio Railway Company will make expenditures for improvements and equipment at that point amounting to $1,000,000, including enlargement of the roundhouse and shops.

The Biggstaff Cannel Coal Company, Mt. Sterling, Ky., has been reorganized, with Ralph Wilson, of Frankfort, Ky., as president, and J. Clay Cooper, of Mt. Sterling, as secretary-treasurer and manager. The company proposes to begin development operations in the spring on its 700-acre tract of coal land, including a fine field of cannel coal. Power and conveying machinery, as well as special equipment, will be needed.

The Turkeyfoot Lumber Company, Lexington, Ky., which is building a branch line to reach its timber holdings in Jackson County, Ky., will probably erect a large saw-mill in that section.

The Parker buggy plant and the H. P. Ousler foundry, both located at Suffolk, Va., were destroyed by fire November 2 with a loss of $100,000.

The Lynchburg Stone Company, Lynchburg, Va., is purchasing quarry equipment designed to double the capacity of its plant.

The Breinig Mfg. Company, Nicolette, W. Va., has completed arrangements for a site for its plant, which will manufacture amusement park devices.

The Cumberland Motor Company, Nashville, Tenn., Joseph Cheek, president, intends to erect and equip a large and up-to-date garage, with complete facilities for all kinds of automobile repairs.

The International Heating Company, Nashville, Tenn., H. M. Grubbs, president, Walter M. Grubbs, secretary, and B. B. Coffey, manager, is considering plans for its plant, which will manufacture heating crates and double radiating hot-air furnaces. Bids will be called for in about 30 days.

The Davidson, Hicks & Green Company, Nashville, Tenn., will require saw-mill machinery for the development of the timber on a 15,000-acre tract in the hardwood belt which it recently purchased.

The Kelsey Wheel Company, Detroit, Mich., will operate at Memphis, Tenn., a plant to manufacture automobile spokes and rims. Two buildings have already been completed of the three proposed. The plant will have a daily capacity of 25,000 spokes and 4000 rims, and machinery will be installed to cost $12,000.

The Beare Bros. Ice Company will erect an ice plant at Jackson, Tenn., and have already awarded a contract for the construction of a $20,000 building. The equipment will cost between $40,000 and $50,000.

The Moscow Cooperage & Lumber Company, Moscow, Tenn., will rebuild its heading plant, which was recently burned with a loss of $10,000.

The plant of the Mascot Stove & Mfg. Company, Dalton, Ga., which has been idle for several years, has been purchased by J. T. Weathers, of Atlanta, Ga., who proposes to begin operating it in a short time.

The Southern Art Metal Company, Americus, Ga., has been organized with an authorized capital stock of $100,000, to manufacture sheet metal products. C. C. Hawkins is president, L. W. Rose vice-president and general manager, and W. G. Hooks secretary and treasurer.

The C. W. Murry Company, Atlanta, Ga., has been awarded the contract for the installation of a water and light plant at Meigs, Ga.

W. E. Aycock, Moultrie, Ga., is in the market for sawmill equipment to manufacture 40,000 ft. of lumber daily. The mill will be erected in Thomas County, Ga.

The Richton Lumber Company, Richton, Miss., will put in a hardwood mill at that point, in addition to the plant already in operation there.

Birmingham

BIRMINGHAM, ALA., November 11, 1912.

Large machinery and pump dealers report an autumn business much in excess of the same period in 1911, with prospect of continuous activity for some time. Two of the most important factors in the market are the Louisville & Nashville Railroad and the Alabama Interstate Power Company, of Birmingham. Contractors constructing the extensive double track work of the former in Alabama and Tennessee and for the latter on dams and power houses on Alabama rivers are extensive purchasers of a variety of machinery. Many new factories and mines are also in the market for engines, boilers and machinery, while the machine repair shops and dealers in small goods, such as belting, are doing a satisfactory business. Several sales of centrifugal pumps are reported. The general status and prospect are equally good, as reported by the principal dealers.

La Grange, Ga., has voted $30,000 of bonds to establish a gas plant. J. D. Edmundson is mayor.

The Southern Menhaden Company, Jacksonville, Fla., will establish a plant for the manufacture of fertilizers and oil from fish at Ponce Park, Fla.

J. H. Davis, Sasser, Ga., will establish a bottling plant at Tifton, Ga.

Architect Fred. James, West Tampa, Fla., is preparing plans for a cold storage plant to be erected by Crenshaw Brothers at Tampa, Fla.

D. T. Sutherland, Bainbridge, Ga., will use new machinery throughout in new buildings now under construction that will double the capacity of the present plant and will be used for the manufacture of pulleys, cane mills, etc.

Contract has been awarded to John Cunningham, Jackson, Ga., to erect buildings for fertilizer plant for the Empire Cotton Oil Company, Atlanta.

The Withers Turpentine Company, Pensacola, Fla., has applied for a charter, with a capital stock of $60,000, to manufacture naval stores. J. H. Smithwick is president.

W. J. Henderson, Tifton, Ga., will sink oil wells on 1500-acre tract near Chipley, Fla.

The Jasper Cypress Company, Jasper, Ala., has been chartered, with $25,000 capital stock, to manufacture lumber and shingles. J. F. Doran is president.

Application has been made at Brunswick, Ga., for the incorporation of the Morgan-Gould Lumber Company with a capital stock of $15,000 to operate planing and saw-mills.

St. Louis

ST. LOUIS, MO., November 10, 1912.

The distractions of election week have had their natural effect on the machine tool market, reducing the demand as well as the total of business done. Dealers report more active inquiry toward the close of the week, with expectations of a further gain in the coming period. Generally, good business is looked for, there being an impression that the present impetus of business cannot be easily disturbed.

The contract for the heating plant for the 21-story Railway Exchange Building, now under construction at St. Louis, was awarded last week to the Hanley-Casey Company, of St. Louis. The contract, about $300,000 in amount, is the largest of its kind ever let in the city.

The St. Louis Belt, Illinois & Eastern Traction Company has been incorporated by J. D. Houseman, Roe Building, St. Louis, E. W. Rannells, John Brennan, B. Whice, Joseph C. Darst and others, with $600,000 capital stock, to build and equip with power houses, etc., a belt line to serve interurban electric lines planning to enter St. Louis.

The East St. Louis, Columbia & Waterloo Electric Railroad has issued $1,000,000 in bonds for the purpose of extending its powerhouse and other equipment.

The Pennsylvania Railroad has begun the construction of what is reputed to be the largest roundhouse in the country at East St. Louis. Considerable repair shop equipment is to be installed in the new structure.

The American Mfg. Company, cordage and bagging manufacturer, has plans for a $20,000 addition to its plant, exclusive of the required machinery therefor.

The Mesker Bros. Iron Company, St. Louis, has been incorporated, with a capital stock of $50,000, to take over the Mesker Bros. Iron Works. The incorporators are Bernard T., Frank and John L. Mesker, the last named formerly the operator of the Eagle Metal Works.

The electric plant at Union, Mo., has been purchased by C. S. Ruffner, representing the Mississippi River Power Distributing Company, and it is understood that considerable new equipment will be added as a preliminary to utilizing hydro-electric power from the Keokuk plant.

The Big Four Railroad has completed plans for the electrification of its yards at Hillsboro, Ill., its roundhouse, machine shops and turntable, as well as for its coal docks at that point. The Hillsboro Electric Light & Power Company has the contract for supplying the power.

The Alice Dayton Land & Mining Company, St. Louis, has been incorporated with $40,000 capital by Geo. W. Mallow, William R. Knox, F. H. Mitchell and Clifford Fears to equip and operate mining property owned by them.

The Casper Land & Lumber Company, St. Louis, has been organized and incorporated with $20,000 capital stock by Harry E. Voss, E. G. Wenige, K. Beckers and C. Sessinghaus to equip a plant for the manufacture of lumber, shingles, boxes, laths, etc.

The Muehling Motor Car Company, St. Louis, with $15,000 capital stock, has been incorporated to equip a motor car repair plant.

The construction of a cotton mill at Little Rock, Ark., is being promoted by the Chamber of Commerce there. The secretary, in charge, is C. C. Kirkpatrick.

A refrigeration plant and storing building will be built at Muskogee, Okla., by Armour & Co., to cost, including equipment, $30,000.

A fire brick plant to cost, with equipment, about $500,000, is reported to be contemplated at Fulton, Mo., by the Chicago Firebrick Company, of Chicago, Ill., of which W. J. Gilbert, Chamber of Commerce Building, is manager.

Ethridge & Jones, Schlater, Miss., whose cotton compress and gin at that point was recently destroyed, announce that they will rebuild and re-equip the plant.

The Marianna Electric Company, Marianna, Ark., has been incorporated by E. C. Hornor, of Helena, Ark. J. S. and A. P. Hornor will improve the existing plant at Marianna. An interurban line is also planned.

The Wagner Electric Company, St. Louis, has awarded a contract for an addition to its power plant to cost, with new equipment, about $30,000.

The Cliffdale Mill Company, Brickeys Station, Mo., with $16,000 capital stock, has been incorporated by R. E. Rombauer, Theodore A. Carron and Louis Doerge and will equip a plant at once.

The Marion Oil Company, Okmulgee, Okla., has been incorporated, with $25,000 capital stock, by R. E. Hileman of Okmulgee, C. L. Thomas of Muskogee, and Walter Hennig of St. Louis, Mo.

The Moon Motor Car Company, St. Louis, has plans for the enlargement of its plant and for additions to its mechanical equipment of considerable extent.

Water works plans are being prepared for a municipal plant at Aux Basse, Mo., by Richard H. Phillips, engineer, of St. Louis.

The city of Maryville, Mo., which recently voted a $100,000 bond issue to buy an existing plant, has made the purchase for $50,000 and will expend the rest for improvements in the pumping station and on other equipment.

Water works plans are being prepared for the city of Memphis, Mo., by Rollins & Westover, of Kansas City, Mo.

The sugar mill of S. J. Gianelloni at the Longwood plantation near Baton Rouge, La., was burned with a loss of $115,000 the past week. It will be rebuilt and re-equipped.

The machinery plant of the Standard Box & Packing Company, New Orleans, La., which was damaged $15,000 by fire last week, will be replaced at once.

The Forest City Land & Lumber Company, Forest, Miss., has increased its capital stock from $100,000 to $300,000 for the purpose of extending its milling equipment and enlarging its operations generally.

The Purity Ice & Bottling Company, Wagoner, Okla., has plans for increasing its ice making plant from 15 to 40 tons per day capacity at once.

The Varner Land & Lumber Company, which has bought about 10,000 acres of white oak and hickory timber near Altheimer, Ark., will add to its mill plant, increasing its capacity to 40,000 ft. per day.

The James Tailing Mill Company, Joplin, Mo., with $10,000 capital stock, has been incorporated by J. W. Busard of Kansas City, Mo., M. R. Lively of Webb City, Mo., and S. A. James of Joplin, Mo., and will equip a plant for concentrating ores.

A mill and other mining equipment is to be installed on property at Badger, Mo., by the owners, George Horning, W. Gorman and Aach & Co., of Galena, Kan.

The Winston Button Company, Camden, Ark., with $50,000 capital stock, has been incorporated by E. V. Winston, W. H. Hall and W. B. Elliott to equip a plant for the manufacture of mussel shell buttons.

A mill of 125 tons capacity will be installed on the mining land of the Lagonda Lead & Zinc Company at Tuckahoe, Mo.

The St. Tammany Lumber Mfg. Company, Covington, La., with $250,000 capital stock, has been incorporated by C. G. and M. M. Hull, J. S. Jones and J. H. Cassidy and will build a plant at once. The company controls about 150,000,000 ft. of uncut timber.

A sawmill with a daily capacity of 20,000 ft. will be equipped by J. H. Williams at Kinder, La., and associates, who have recently bought a timber tract.

The equipment and operation of sawmills, shingle mills, etc., is the purpose of the Southern Delta Land Company, with $100,000 capital stock, recently incorporated by E. E. Brown, J. S. Boatner and C. R. Byrnes of Vidalia, La.

The Cutting Motor Car Company, Jackson, Mich., has completed arrangements for a branch factory at Kansas City, Mo., to cover western territory.

The Fisher Machine Works Company, Fourth and Choctaw streets, Leavenworth, Kan., suffered a loss by fire to its foundry building estimated at $20,000. No definite plans have been made for rebuilding.

The Tower Grove Foundry Company, St. Louis, Mo., is making an addition to its foundry 60 x 71 ft. A new ten-ton electric crane will be installed.

The Alexander Kilpatrick & Sons Company, St. Louis, Mo., has taken out a permit covering the erection of a $20,000 foundry building which it will occupy shortly. The new structure will be 140 x 240 ft., one story, of brick and steel with concrete foundations. The company manufactures iron kettles.

The McCall Incinerator Company, Memphis, Tenn., has secured a site at Little Rock, Ark., for the erection of a plant to supply its Southwestern trade. The company has a capital stock of $500,000 and is a manufacturer of sanitary devices.

The City Council of Booneville, Ark., is considering the construction of a municipal water works plant.

The Municipal Light and Water Commission, Donaldsonville, La., will install Diesel engines and other improved machinery in the local plant at a cost of $40,000.

The plant of the Standard Box & Package Company, New Orleans, La., was destroyed by fire last week, with a loss of $25,000, of which $15,000 was in machinery, only partially insured.

Texas

AUSTIN, TEXAS, November 9, 1912.

While there was no appreciable effect upon the operation of industries and trade generally during the time the Presidential campaign was in progress it is expected that now that the political excitement is over there will be an increase in business generally. This particularly applies to the trade that depends more or less upon outside capital. It is known that there are many investors in Northern and Eastern States who have in contemplation the placing of considerable money in Texas manufacturing and other industrial enterprises, and it is expected that these plans will now be carried into effect. Trade conditions could hardly be better in all parts of the State, not only in the machinery line but all other phases of business. The cotton crop is practically harvested and the total yield comes up to the early predictions, approximately 4,800,000 bales. Prices have been very satisfactory all through the season, and an enormous amount of money has been already brought into the State from the sale of the staple.

The Eastern Texas Traction Company has awarded the contract to Karner Bros., Dallas, for the construction of the interurban electric line between Dallas and Greenville. The amount involved in the contract is approximately $400,000. It includes the grading, concrete construction and bridge work.

S. M. Swenson & Sons, bankers, of New York, and associates are interested in the proposition of establishing a sugar refinery at Freeport, Texas, at a cost of $2,000,000. It is authoritatively announced that plans for the proposed plant have been prepared and that its erection will soon be started. It is proposed to have it ready for operation in about a year. They are also establishing a new town and deep water port at Freeport, together with several large industrial plants, one of the most important of which is a sulphur refinery to treat the product of the large sulphur mines which the syndicate is opening up near the town.

E. W. Clark has purchased the property of the Snyder Ice, Light & Power Company, Snyder, and will improve the lighting and power plant.

The Farmers' Handy Wagon Company, Saginaw, Mich., will establish a plant at Fort Worth for the manufacture of silos. The proposed plant will cost about $50,000.

The Texas Light & Power Company, Dallas, has purchased the holdings at El Paso of the El Paso Gas & Electric Company. The new owner will extend the lighting system and enlarge the plant.

The taxpayers of El Paso have voted favorably on the proposition of issuing $400,000 of municipal improvement bonds. Of this sum $200,000 will be used for improving and extending the waterworks plant and distributing system, $150,000 for extending the sewer system and $50,000 for street improvements.

The Coldren Land Company, Kansas City, Mo., has awarded a contract to the Dempster Mill Mfg. Company of Beatrice, Neb., for the installation of 12 irrigation pumping plants, each with a capacity of more than 1,500,00 gal. of water per 24 hours upon wells that it will bore on a large tract of land in the Black Water valley of the Texas Panhandle. The water supply derived from these wells will be used for irrigating the land.

The Poteet Ice, Light & Power Company, Poteet, has been organized with a capital stock of $10,000. The incorporators are J. L. Burd, C. J. Ernest and Van H. Howard, all of San Antonio.

F. J. Bosler will establish a plant at Texarkana, Texas, for the manufacture of wagon hubs. The timber supply for the factory will be obtained from a tract of 20,000 acres of ash forest owned by Mr. Bosler situated near Texarkana.

The Victoria Safe & Lock Company, Victoria, Texas, has had plans prepared for the erection of a foundry on a site recently acquired. The equipment requirements are not as yet completed but tentative plans call for a set of heavy straightening rolls, power equipment, lathes and smaller machinery.

The Pacific Coast

SAN FRANCISCO, CAL., November 6, 1912.

The local machine tool market is uninteresting at present, sales having fallen off somewhat in the latter part of October, though some improvement is expected after election. The Western Pacific business is still to be placed, and a good many single tool orders are temporarily delayed. The outlook for next year is uncertain, but it may be remarked that the installation of new tools this year has been limited to actual necessities, and any improvement in the last six months has been in response to underlying conditions. Moreover, the railroad and hydroelectric construction recently undertaken is based on the actual requirements of the country, and many similar projects are awaiting financial support.

Heavy construction work in some quarters has been interrupted by weather conditions, and the movement of contractors' equipment is likely to be curtailed for the next few months. Second-hand equipment from the Los Angeles aqueduct is being placed on the southern California market, present offerings including a lot of drilling outfits and compressors, a steam shovel, etc. Notwithstanding the activity of the lumber market, local planing mills are buying very little, and the general sawmill trade is quiet.

In addition to the new machinery to be purchased, it is announced that the Western Pacific Railroad will move the equipment of several other shops to the new plant near Sacramento.

The Oakland & Antioch Railroad has completed its new shop at Oakland, and will start operation shortly.

It is announced that plans will be figured shortly for the machinery hall of the Panama-Pacific Exposition, the cost of which is estimated at about $500,000.

A revival of shipbuilding is expected next year. Most local shops equipped for such work are well occupied with ship repairs, and plans are under way for a number of steel coasting vessels. The Union Iron Works is building a $76,000 steel river steamer for the Standard Oil Company, to be equipped with gasoline pumping engines. The Union Iron Works has just let contracts for its new power house and wharf.

A. G. Linz is installing a small machine shop at Santa Rosa, Cal.

The Inland Iron Company, Fresno, Cal., Roy Hall, manager, is preparing to build a new plant at a cost of $20,000.

The Union Planing Mill, Vallejo, Cal., plans to build a new mill of double its present capacity.

The White Pine Lumber & Box Company has commenced construction of a new box factory near Portola, Cal.

The Holt Mfg. Company, Stockton, Cal., is shipping a number of "caterpillar" traction engines to the Hawaiian Islands.

A new building to be erected for the Cadillac automobile agency at Sacramento, Cal., will include a well equipped machine and repair shop.

The Colusa Foundry, Colusa, Cal., has been sold by the Frank Wulff estate to E. D. Santos, who expects to put in some new machinery.

The Davis & Marks Iron Works, San Francisco, has been incorporated with a capital stock of $50,000 by D. O. Marks, T. M. and N. K. Davis.

The town of Monrovia, Cal., is considering the purchase of a steam roller and other street machinery.

The Sperry Flour Company is installing a lot of grain-cleaning machinery in its mill at Stockton, Cal.

It is announced that the Anaheim Sugar Company, Anaheim, Cal., will make a large addition to its plant before the next beet harvest.

The Union Oil Company is planning to add several new units to its gasoline plant in the Santa Maria oil field.

The Brisco Consolidated Iron Works, Hanford, Cal., has been incorporated with a capital stock of $500,000 by H. Brisco, G. V. Reed, F. N. Isaac, J. O. Hickman and others. Engines, pumps and motors will be manufactured.

Plans are about complete for an oil distributing system in the Presidio, and an electric lighting system at Fort Mason, this city.

It is reported that the Southern California Edison Company will add another unit to its large electric power plant at Long Beach, Cal.

The Water Users' Association of Phoenix, Ariz., has figures under consideration for six water wheels and accessories, the lowest bid being about $75,000.

The Mt. Shasta Power Company is shipping a lot of power and drilling machinery to the site of its proposed seven-mile tunnel on the Pit River.

The Westinghouse Electric & Mfg. Company has taken a contract for generator equipment for the two power houses of the Pacific Gas & Electric Company's Bear River development, including four 12,500 kva. water wheel generators. The water wheels are of the double overhung type, of 8500 hp. capacity each. The Pacific Gas & Electric Company has also ordered from the Crocker-Wheeler Company two railway motor generator sets, each of 1000 kw. capacity, for its Oakland and Sacramento power houses.

Canada

TORONTO, ONT., November 11, 1912.

The Canadian Rumley Company, Toronto, Ont., is about to let contract for a paint shop at its plant which will be 213 x 176 x 276 ft., one story, triangular in shape and of brick construction.

The Empire Cotton Company, Ltd., recently incorporated with a capital stock of $3,000,000, has let a contract for the construction of its plant in Welland, Ont., on a site of 15 acres recently purchased on the Grand Trunk Railway and Hendershot street, adjoining the Canada Forge Works, to H. E. Hitch & Co. of Montreal and Toronto. The buildings will be of brick and steel, comprising mill buildings 116 x 247 ft., 188 x 230 ft. and 60 x 230 ft., respectively; warehouse 100 x 400 ft; pump house 27 x 35 ft., and office building 38 x 70 ft. The machinery to be installed will include 679 looms and 25,000 spindles of spinning machinery besides motive power equipment, sprinkler system, etc. The cost of machinery will be about $500,000. Charles T. Grantham, the head of the company, was for ten years manager of the Imperial Cotton Company of Hamilton.

The Canada Foundry Company, Toronto, has received a contract for an electric pump from the Board of Water Commissioners, Niagara Falls, Ont., for the waterworks in that city at its bid of $5,700.

The Northey Simnen Signal Company, Ltd., Toronto, recently incorporated with a capital stock of $5,200,000, will manufacture signaling appliances for railway and marine service. John P. Northey, Thomas A. Plummer and Thomas P. Wadsworth are among the provisional directors. A plant is being arranged for.

The Standard Garage Company, Ltd., Toronto, recently incorporated with a capital stock of $40,000, will engage in the manufacture of automobiles and also general machinery. Samuel W. and Harold W. Marchmont and Douglass L. Berwick are the provisional directors.

The A. J. Deer Company, Toronto, has been incorporated with authorized capital stock of $40,000 by John Alexander Macintosh of Toronto to manufacture and deal in electric motors and grinding and cutting machines.

The Canada Grip Nut Company, Ltd., Montreal, has been incorporated with a capital stock of $250,000 to manufacture and deal in iron and steel and other metals. The incorporators are E. Malcolm McDougall, Gilbert Sutherland Stairs, John B. Henderson and others.

Government Purchases

WASHINGTON, D. C., November 11, 1912.

The Treasury Department, office of supervising architect, Washington, will open bids December 4 for furnishing and installing one electric passenger elevator in the post office, Raleigh, N. C.

All bids received October 1 by the supervising architect, Treasury Department, for installing a mechanical system for mail handling apparatus in the New York City post office having been rejected, the Department will receive further proposals December 2.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids November 5 for materials and supplies for the navy yards as follows:

Schedule 4883, class 23, one double back-geared engine lathe for delivery to Portsmouth—Bidder 74, I. H. Johnson, Jr., Company, Philadelphia, Pa., $2,411 and $2,700, alternates $2,288 and $2,577; 108, Niles-Bement-Pond Company, New York, $2,980 alternate $2,630; 51, Fairbanks Company, Washington, D. C., $2,131 alternate; 82, R. K. LeBlond Machine Tool Company, Cincinnati, Ohio, $2,792, alternate.

Schedule 4895, class 131, one high-duty lathe for delivery to Annapolis—Bidder 4, American Tool Works Company, Cincinnati, Ohio, $1,375; 51, Fairbanks Company, Washington D. C., $1,191; 60, Garvin Machine Company, New York, $1,300 and $1,408; 77, Kemp Machinery Company, Baltimore, Md., $1,298 and $1,175; 103, Niles-Bement-Pond Company, New York, $1,300; 128, Springfield Machine Tool Company Springfield, Ohio, $1,350.

The Bureau of Yards and Docks, Navy Department, Washington, opened bids November 4 for additional power plant appurtenances including one closed heater, one oil separator, one automatically controlled pump, receiver, valves and piping to be installed at Portsmouth, N. H., as follows: John W. Danforth Company, Buffalo, N. Y., $3,996 and $4,155; Evans-Almiral Company, New York, $5,445; Walworth Mfg. Company, Boston, Mass, $4,618.

The Bureau of Yards and Docks, Navy Department, Washington, opened bids November 4 for furnishing one 15-ton locomotive crane at the naval station, Pearl Harbor, H. T., as follows: Browning Engineering Company, Cleveland, Ohio, $9,198; Brown Hoisting Machinery Company, Cleveland, Ohio, $9,700 and $9,200.

Trade Publications

Oblique Machine Tool Vise.—Sellew Machine Tool Company, Pawtucket, R. I. Circular. Describes and illustrates an oblique vise for angular tool and die work. The vise is intended for use on lathes and planing and shaping machines and has three sets of graduations to facilitate setting it in the great variety of positions desired for this kind of work. Among the special features claimed for it are accuracy of work, ability to take heavy cuts and an increased rigidity due to a solid support.

Fans.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Bulletin No. 199. Describes and illustrates the company's line of Monogram fans which are built for delivering large volumes at moderate pressures. They are designed either as blowers or exhausters and for discharges either right or left hand and are adapted for direct connection to electric motors, steam turbines or a belt drive from an engine, electric motor or countershaft. The special features of these fans are briefly touched upon and there are numerous illustrations of the different arrangements which can be supplied. Reference is also made to special fans which can be built and accessories such as countershafts and blast gates. Complete dimension tables of the various types of fans are included.

Hammer Drills.—McKiernan-Terry Drill Company, 115 Broadway, New York City. Pamphlet. Illustrates the Busy Bee line of hammer drills for shaft sinking, trenching, breaking boulders and for a great variety of work in mines, quarries and tunnels and wherever holes not more than 8 ft. in depth are to be drilled. One of the special advantages of these drills is that they can be operated where there is not sufficient room for a hand driller to swing a hammer. The two types of drills are illustrated, assembled and taken apart, with the various parts numbered for convenience in ordering repairs. Several views of the drills in use are also included.

Stokers.—American Engineering Company, Philadelphia, Pa. Prochure entitled "The Trail of a Pioneer." Is a glimpse into fourteen representative plants among several hundred which have been equipped with Taylor stokers. Among the plants are the new one of the Boston Elevated Railroad, which probably represents the highest development of the modern steam turbine power station, the plant of the Hartford Electric Light Company, where four of the largest mechanical stokers that have ever been constructed are installed, and the Waterside station of the New York Edison Company. All of the fourteen plants are illustrated with a brief description of their special features.

Metal Roofing and Cans.—Wheeling Corrugating Company, Wheeling, W. Va. Five leaflets. Call attention to corrugated roofing and siding, metal shingles, fire buckets, tanks and oily waste and general purpose galvanized cans.

Electric-Air Rock Drills.—Ingersoll-Rand Company, 11 Broadway, New York City. Five pamphlets. Catalogue No. 384-F gives instructions for installing and operating the Temple-Ingersoll electric-air rock drill. Bulletin No. 4023 describes and illustrates the 4-E type of drill which will operate with either direct or alternating current and will drill a vertical hole ranging from 1¼ to 2 in. in diameter up to a maximum depth of 12 ft. Form No. 601 gives instructions for operating the 5-F machine together with a list of duplicate parts and bulletin No. 4025 describes this drill. Form No. 4209, superseding No. 4109, describes a general line of drills which are driven by pulsations of compressed air created by a pulsator actuated by a standard electric motor. All of the pamphlets contain views of the drill in section and also at work.

Lubricators, Water Gauges and General Brass Goods.—McRae & Roberts Company, 211 Campbell avenue, Detroit, Mich. Catalogue No. 11. Size, 6 x 9 in.; pages, 456. Lists an extensive line of lubricators, oil and grease cups, water gauges and gauge cocks and high grade brass goods for steam, water and gas. All of these are illustrated and briefly described, together with condensed specification tables. A complete alphabetical index covering 11 pages and a 5-page numerical index to figure numbers render the finding of any desired article a comparatively simple matter.

Toggle Bolts.—Star Expansion Bolt Company, 147 Cedar street, New York City. Pocket size booklet. Contains illustrations, descriptions and list prices of the various types of toggle bolts which this company manufactures.

Foundry Cranes and Equipments.—Whiting Foundry Equipment Company, Harvey, Ill. Catalogue No. 99. Furnishes foundrymen with descriptions and illustrations in a condensed form of the cranes and foundry machinery manufactured by this company and the equipment of complete foundry plants. After a typical foundry layout is shown, a list of foundry cranes and equipment is given, followed by illustrations and brief descriptions.

Turbine-Driven Boiler Feed Pumps.—Alberger Pump & Condenser Company, 140 Cedar Street, New York City. Pamphlet. Shows a number of different types of turbine-driven boiler feed pumps. An interesting feature of the pamphlet is the use of facing pages to show the small number of oiling points in a turbine-driven pump as compared with the large number in a reciprocating pump and the difference in the number of moving parts. An outline elevation of the pump, together with a brief table of dimensions, is included.

Pumps and Receivers.—Dean Steam Pump Company, 115 Broadway, New York City. Bulletin D-222. Illustrates and describes a number of types of apparatus for withdrawing water of condensation from heating systems and machinery using steam and returning it to the boiler promptly. This apparatus comprises a receiver or tank into which the discharge from the piping or machinery drains, a steam or electrically driven pump which draws the water from the receiver and pumps it back into the boiler under pressure, automatic devices for regulating these operations and the necessary water and steam or electrical connections. Brief specification tables are given in connection with the illustrations of the different pumps.

Ventilators and Tank Heater.—Sterling Foundry Company, Sterling, Ill. Catalogue C. Illustrates and describes several types of chimney ventilators and a cast-iron tank heater. In addition to these various other hardware specialties are also listed.

Water Softening Apparatus.—Dodge Mfg. Company, Mishawaka, Ind. Post card. Relates to the use of the Eureka water softener, which is designed to remove all the scale-forming impurities from boiler feed water before it enters the boiler.

Shaping Machines.—Gould & Eberhardt, Newark, N. J. Circular. Treats of the Invincible 24-in. shaping machine, which is arranged with an adjustable-speed motor, an automatic starter and dynamic brake control. The circular contains a halftone engraving of the machine together with a brief description and a condensed table of specifications. An illustrated description of this machine appeared in *The Iron Age* August 31, 1912.

Boilers.—Columbiana Boiler Company, Columbiana, Ohio. 48-page pamphlet. Devoted to the products of the company, which include boilers of all descriptions, air receivers, rendering tanks, riveted and welded galvanizing kettles and pans, welded tinning and annealing kettles, annealing covers and shells, annealing tanks, foundry flasks and other steel specialties. Illustrations of many of these products are included.

Gears.—Foote Brothers Gear & Machine Company, 210 North Carpenter street, Chicago, Ill. Catalogue and price list. Tenth edition superseding all previous lists. Contains lists of the various

sizes of spur, bevel and worm gears which this company is prepared to furnish as well as rawhide pinions and reducing gears. All of these are illustrated together with reproductions of tooth forms and a large number of tables of useful information are included.

Turbo-Generating Sets.—B. F. Sturtevant Company, Hyde Park, Mass. Mailing card. Calls attention to a small turbo-generating set built in sizes ranging from 3 to 15 kw., which is designed for use when it is desired to run only a portion of a plant overtime or for carrying the extra lighting load in winter. The advantages claimed for this set are economy, simplicity and durability and by employing one it is possible to shut the large engine down.

Tube Mill Liner and Steel Gears and Pinions.—Edgar Allen American Manganese Steel Company, McCormick Building, Chicago, Ill. Bulletin No. 52 and pamphlet. The former gives general description and specifications for the Komata liner for tube mills, which consists of a series of plates and lifting bars. The points of merit about the liner are briefly touched upon and results of a comparative test between this liner and several others are included together with testimonial letters. The pamphlet is devoted to special ground gears and pinions for use in electric railway work. A description of the manner in which these gears are made is given together with illustrations of typical gears.

Oil Burning Appliances.—Tate-Jones & Co., Inc., Empire Building, Pittsburgh, Pa. Catalogue. Calls attention to a line of oil burners for furnaces, boilers, kilns, dryers, etc., and the pumping systems employed for pumping, heating and regulating the flow of oil to the burners. All of these are illustrated and briefly described with condensed tables of specifications.

Steel Sheets.—West Penn Steel Company, Brackenridge, Pa. Booklet. Size, 3¼x6¼ in.; pages, 96. Gives the highest and lowest prices of steel sheets for a period of years, the output of plates and sheet steel in the United States from 1891 and also a list of tables of weights of soft steel sheets, the last occupying the greater portion of the booklet. The figures given in the tables are based on soft steel sheets, and the company states that they have proved correct in actual practice and it is desirable to use them where accuracy is essential. A square foot of No. 24 gauge soft steel weighs 1.02 lb., which is 0.02 lb. more than the United States standard, which was authorized before soft steel took the place of iron sheets.

Steam Turbines.—DeLaval Steam Turbine Company, Trenton, N. J. Catalogue D. Size, 6x9 in.; pages, 120. More than a third of the publication is devoted to a discussion of the finding of the best means of reconciling the high speed natural to steam turbines with the low or moderate speeds of driven machinery, together with the relative advantages of the several fundamental types of turbines. The remainder of the book is occupied by a detailed description of the design and construction of the multistage turbine, which is built in capacities of 500 hp. and upward and of the company's speed reduction gear which was illustrated in *The Iron Age* April 13, 1911. A chart accompanied by a steam scale, which enables the energy available from the expansion of steam within given limits to be read off directly in any of the customary quantities, is also included.

Toolroom Lathe.—American Tool Works Company, Cincinnati, Ohio. Circular. Illustrations and descriptive matter explain the operation of the American high duty toolroom lathe, which was illustrated in *The Iron Age*, August 31, 1912. These lathes are built in four sizes ranging from 14 to 20 in. in swing. Although designated as a toolroom lathe, the various attachments required to handle all classes of toolroom work, such as the taper, drawing and relieving attachments are not furnished with the lathe, but are supplied separately. An extensive description of these attachments is given and the text is supplemented by halftone engravings.

Tool Holders.—Armstrong Bros. Tool Company, 339 North Francisco avenue, Chicago, Ill. Catalogue A-12. Deals with a line of tool holders having inserted self-hardening steel cutters for performing variations metalworking operations. Other specialties in machine shop tools, including lathe dogs, clamps, drill sleeves and wrenches of various types are also illustrated and described.

Welding, Cutting and Brazing of Metals.—Atlantic Blaugas Company, 381 Fourth avenue, New York City. Catalogue. Deals with the Blaugas process of welding, cutting and brazing which was illustrated in *The Iron Age*, September 5, 1912. The principle upon which this process operates is the same as the oxy-acetylene one, the gas used, however, being a compressed liquefied distillation gas produced from mineral oils. Considerable data on the process are given and there are a number of illustrations of typical operations, including the cutting away of the steelwork in the Equitable Life Assurance Society's Building.

Gear Bronzes.—Wm. Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa. Pamphlet. Gives a limited general description of the various gear bronzes supplied by this company. After a brief list of the different metals and their uses, all are taken up and described in some detail, each of the descriptions being supplemented by an engraving of a typical piece of gearing made from the metal.

Baltimore Industrial and Business Notes

The Ellicott Machine Corporation is operating both its plants on full time, largely on orders for marine dredge work previously in hand. New business is comparatively light, although considerable inquiry is being figured on.

The Carnegie Steel Company has begun the erection of several buildings at its plant at Bush and Wicomico streets. These include a warehouse, 92 x 384 ft., which will be used for the storage of structural material; an 80 x 62-ft. addition to the present fabricating shops; a 36 x 125-ft. template shop and a 20 x 40-ft. storage building for template lumber and patterns. These buildings will all be of structural steel frame, covered with corrugated iron and slag roofs. This company has also acquired recently about 9 acres of land, comprising two city blocks adjoining its present property, which has been purchased for probable extensions, although no definite plans have been announced. The fabricating department of the local Carnegie warehouse is operating at full capacity, entirely on work for the export trade.

The Baltimore & Ohio Railroad has acquired considerable property along its lines in the vicinity of Sharp street which will probably be used for warehouse purposes. Extensive improvements are contemplated in the vicinity of its Locust Point piers.

The Wallace Stebbins & Sons Company will furnish two Fitzgibbons boilers, 150 hp. each, to be installed at St. Charles' College, Catonsville, Md. The demand for boilers and engines has been comparatively small, although a very fair business is reported in mill and machine shop supplies.

Plans for the erection of a large plant, previously noted, for the Maryland Fire Brick Company, Harwood, Md., are progressing favorably and active building operations will, it is stated, shortly be started.

Detrich Brothers, structural and ornamental iron fabricators, have booked a large number of small orders during the past month, the majority being for small building work ranging up to 50 tons. The shop is being operated at full capacity and the outlook for continued activity in small work is very favorable.

The Schaal-Crouch Automobile Company is reported to have purchased a parcel of land, 62 x 185 ft., on North avenue, near Maryland avenue, on which a two-story garage, from plans by A. Lowther Forrest, architect, will be erected.

The Terminal Heating & Freezing Company is considering the erection of a six-story reinforced concrete warehouse at 409-411 Conway street. The plans call for steam heat and elevator installations.

The T. C. Bashor Company has been comparatively busy in the past month. Among recent orders is one for the heating installation for the new buildings of the Carnegie Steel Company in this city. A boiler and pump will be furnished the Western Maryland Railroad Company and the piping and breeches for an installation of Babcock & Wilcox boilers will be furnished for the National Soldiers' Home, Phoebus, Va. The boiler plant is quite busy, although the demand for tanks has been quieter.

The Chesapeake Iron Works is operating close to full capacity. Orders for structural work have been numerous but small. A contract has been closed for the steel work for the Hinton Building, Elizabeth City, N. C., 175 tons; another for the Thatcher Building, Richmond, Va., 75 tons. Business, while of a small and miscellaneous nature, closes much more readily.

The American Steel Foundries reports its net earnings for the quarter ended September 30 at $507,904, after the usual allowances, as compared with only $41,724 in the corresponding quarter of last year. Net profit was $312,035, against a deficit of $118,926. The net profit for nine months was $424,264, against a deficit of $372,903 in the first nine months of 1911.

It is stated by the officers of the Colorado Fuel & Iron Company that sales of heavy rails already made will take the output of its rail mill for the current fiscal year, which will end June 30, 1913, and orders for other products now on the books will keep the smaller mills running well into 1913.